

# 2022 Addendum 2

## Plant SGCN



2015 NORTH CAROLINA

# WILDLIFE ACTION PLAN

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Design and layout by Robert Kern, TIPS Technical Publishing, Inc. (Carrboro, NC)

Cover design by Bryant Cole, NCWRC

Photographs (clockwise, from left) by:

Appalachian Elktoe (*Alasmidonta raveneliana*), TR Russ, NCWRC

Eastern Painted Bunting (*Passerina ciris ciris*), Kenneth Cole Schneider

Prescribed burning (an important land management tool), Melissa McGaw, NCWRC

Bog Turtle (*Glyptemys muhlenbergii*), Melissa McGaw, NCWRC

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# ADDENDUM 2

1

Chapter 1 Introduction

Road Map to Changes

## 1.4 Addendum 2

The most recent version of North Carolina's Wildlife Action Plan (NCWAP, Plan) represents a 10-year comprehensive review and update and was published in 2015. The U.S. Fish & Wildlife Service (Service) has provided guidance to States for making voluntary interim changes to an approved Plan. The guidance allows States to make minor or major revisions to a Plan, as defined below.

- A **Minor Revision** is a change to a Plan that adheres to the methods, criteria, or processes used to address any of the Eight Required Elements in the approved Plan. Note that clarifying edits, corrections to typographical errors, and/or similar revisions to improve readability do not require Service notification or approval. Minor Revisions are voluntary and can occur anytime at the discretion of the State. The 2015 NCWAP was updated by Addendum 1, a minor revision published in 2020.

Addendum 1 updated the Species of Greatest Conservation Need (SGCN) list after Taxa Teams reevaluated selected species for which there is increased knowledge. The revision also added a description and user guide for the online Conservation Opportunity Area (COA) and Threat Risk Assessment (TRA) tool. Addendum 1 was approved by the Service as a minor revision because the information was developed following the methods described in the 2015 Plan; these revisions were also noted in Chapter 8 of the 2015 Plan.

- A **Major Revision** is a significant change to the methods, criteria, or processes used to address any of the Eight Required Elements in an approved Plan, which would require partner and public comment. Major Revisions are voluntary and can occur anytime at the discretion of the State. The 2015 NCWAP is updated by this Addendum 2 major revision to add plants as Species of Greatest Conservation Need (SGCN) and related information to the appendixes.

Addendum 2 is submitted to the Service as a major revision because plant SGCN were not previously included in the 2015 Plan. Adding plant SGCN is a significant change since criteria for identifying plant SGCN represents new processes and methods, and as required by USFWS guidance carries the need for public review and input opportunities. All information in Addendum 2 is new material to be added to the 2015 Plan.



### 1.4.1 Report Organization and Format

Three chapters and four appendixes are updated by Addendum 2; the remainder of the Plan remains as it was published in 2015 and updated by the 2020 Appendix 1. The following list notes which chapter and appendixes are included in this major revision. A road map outlining where updates and new text can be found is provided in the next section.

- **Chapter 1 Introduction** provides background information on the State Wildlife Grant program, explains why we have the WAP, outlines the revision process used to update the Plan, and describes the required information that is included in the document. Addendum 2 adds Section 1.4 to provide a description of the major revision process and a roadmap to the changes.
- **Chapter 3 Wildlife** is renamed **Chapter 3 Species** because plants are added to the Plan. Chapter 3 outlines federal and state statutes governing wildlife resources. The chapter focuses on the process for evaluating and ranking species to identify SGCN and others for which there are research and management priorities. Addendum 2 adds Section 3.19 to describe plants as a component of natural communities and introduces the N.C. Department of Agriculture, Plant Conservation Program Scientific Committee’s method for evaluating and designating state listed species. For this major update, plants listed for State protection as Endangered, Threatened, or Special Concern are designated as SGCN. This chapter also introduces new or updated appendixes for plant SGCN—Habitat Associations (new Appendix HA-2), a white paper describing the plant SGCN review and selection method (new Appendix R), and a list of all plant SGCN (new Appendix PA-2).
- **Chapter 4 Habitats** contains descriptions of aquatic, wetland, and terrestrial communities based on four primary ecoregions. These natural communities are considered important wildlife habitat and are a priority for conservation. Community descriptions are provided for 12 aquatic communities, 8 wetland communities, 21 terrestrial communities, and the 17 river basins in the state. The descriptions provide information on SGCNs associated with each community, the problems and threats that affect the communities, anticipated climate change impacts, and provides several recommendations for priority surveys, monitoring, research, conservation, or management actions specific to each community. Addendum 2 adds a natural community description for Piedmont and Coastal Plain Oak Forest to the terrestrial community descriptions.
- **Appendix CA-2** adds a list of key participants and partners involved in developing Addendum 2. Also adds a copy of the N.C. Wildlife Resources Commission’s (WRC, Commission) June 2021 notification letter sent to USFWS about intention to complete a

major revision and the 2021 July letter received from the Service acknowledging the major revision.

- **Appendix HA-2 SGCN--Habitat Associations** lists all plant SGCN and shows which natural communities described in Chapter 4 they are associated with. An Excel file is available for this new appendix.
- **Appendix PA-2 SGCN** lists all plant SGCN and provides information on current global and state ranking (NatureServe), federal protection status (ESA), and state protection status (protected species). An Excel file is available for this new appendix.
- **Appendix R Plant SGCN Evaluation Methodology** is a white paper describing the N.C. Department of Agriculture Plant Conservation Program’s Scientific Committee’s evaluation process to designate state listing protection and designates plants as SGCN.

### 1.4.2 Major Revision Roadmap

The 2015 Plan outlines the requirements and process used for developing the WAP and notes the need for future review and revision (see Chapters 1 and 8). The North Carolina Wildlife Resources Commission (WRC, Commission) notified USFWS in June 2021 of the intent to complete a major revision in accordance with guidance published in 2017. The Service acknowledged the update would be a major revision in July 2021. The following Table A2-1 provides a roadmap to the major revisions provided in this Addendum 2.

**Table A2-1 Addendum 2 Revision Road Map**

Insert After	2015 NCWAP Chapter/Section	Revision	2022 Addendum 2 Update Documents
Page 7	1.3.	Adds Section 1.4 Addendum 2 Introduction after Section 1.3.4 (added by Addendum 1)	Chapter 1 Introduction Addendum 2
Page 207	3.14	Adds Section 3.15 Plants after Section 3.14 (added by Addendum 1)	Chapter 3 Species Addendum 2, Section 3.15 Plants
Page 494	4.4	Adds Section 4.4.19 Piedmont and Coastal Plain Oak Forest after Section 4.4.18 Sparsely Settled Mixed Habitats	Chapter 4 Habitats Addendum 2,

**Table A2-1 Addendum 2 Revision Road Map**

<b>Insert After</b>	<b>2015 NCWAP Chapter/Section</b>	<b>Revision</b>	<b>2022 Addendum 2 Update Documents</b>
			Section 4.4.19 Piedmont and Coastal Plain Oak Forest
Page 901	Appendix C	Adds list of Key Participants and Notification Letters to Appendix C Key Participants and Letters of Support	Appendix CA-2 Key Participants and Notification Letters
Page 1203	Appendix H	Adds plant SGCN and habitat association table	Appendix HA-2 Plant SGCN--Habitat Associations
Page 1298	Appendix P	Adds list of plant SGCN	Appendix PA-2 List of Plant SGCN
End of Document	New Appendix	Adds white paper describing Plant Scientific Council methodology for designating state listed species, which are considered SGCN	Appendix R North Carolina Protected Plant Species Evaluation Methodology--Plant SGCN

### 1.4.3 Summary

The 2015 WAP comprehensively addresses the Eight Required Elements and incorporates several of the best practices recommendations published by the Association of Fish and Wildlife Agencies (AFWA). The WRC followed recommendations from the 2009 AFWA guidance on incorporating climate change into State WAPs and worked with a partner to examine how climate change is likely to affect fish and wildlife in North Carolina. An executive summary of the full report (2010 DeWan et al.) is provided in Appendix B of the Plan.

Other best practice recommendations from WAP revision guidance (AFWA 2012) were incorporated during the comprehensive revision, including the following examples.

- WRC developed ranking procedures to identify SGCN, using metrics based on NatureServe's evaluation tool (2012) to quantitatively assess status of fish and wildlife, both range-wide and for populations in North Carolina.
- WRC worked with a partner to develop an online GIS-based tool to identify and spatially depict potential Conservation Opportunity Areas (COAs).



- A classification system using standard descriptions of threats and conservation actions (Salafsky et al. 2008) was incorporated into the 2015 WAP to improve our ability to identify regional concerns outlined in adjacent state Plans.

## 1.4.4 References

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# ADDENDUM 2

3

Chapter 3 Species

Plant SGCN

## 3.15 Plants

The term “habitat” is used in this Wildlife Action Plan to describe the natural communities and their components that sustain individual plants and animals, discrete populations, or taxonomic groups. Habitats are considered the sum of all the resources a species needs to survive and persist (Hall et al. 1997) and are made up of many biotic and abiotic components that are too numerous and diverse to describe in this document.

Many, if not most, of the terrestrial natural communities in North Carolina are composed primarily of plants and, depending on the natural community type, composition will include a range of woody trees, shrubs, herbs and forbs, grasses, non-vascular plants, and composite organisms. Further, plants are fundamental elements of wildlife habitat, providing food, shelter, sites for reproduction, structures for resting and hunting, and often much more, depending on the species or taxonomic group. For example, many wildlife species, such as insect pollinators, butterflies, and moths, are adapted to rely on specific host plants to complete their life cycle.

Since plants are rooted within their landscape position, they are at greater risk to direct impacts from threats when compared to wildlife that are better able to move across the landscape to other areas. Considering this, it is important to support conservation of North Carolina’s native plants considered to be Species of Greatest Conservation Need (SGCN) to preserve genetic diversity and seed sources, especially those limited to small, isolated, or fragmented populations.

This Addendum 2 to the 2015 Plan is submitted as a major revision to add plant SGCN as a component of the natural communities described in Chapter 4 Habitats. A new natural community description for Piedmont and Coastal Plain Oak Forests is added to Section 4.4 Terrestrial Communities. This community type has been added to the new Appendix HA-2, which provides habitat associations for plant SGCN.

### 3.15.1 Introduction

The North Carolina Natural Heritage Program (NCNHP) maintains a statewide inventory of native plant species that are rare, in decline, believed to have been extirpated, or presumed extinct. The inventory is maintained with current data and an updated *Rare Plant List* is published every two years, making it easy to compare the level of current knowledge about a species’ conservation status over a relatively short time frame. The most recent version of the



*Rare Plant List* (NCNHP 2021) lists over 5,300 native plant species for the state. The majority of these are vascular plants, with the remainder including non-vascular and composite organisms that are lichens, mosses, liverworts, and hornworts. Approximately 18% of the native plant species occurring in NC are tracked by the Natural Heritage Program as state listed Endangered, Threatened, Special Concern, or Significantly Rare, indicating the need for high conservation concern for these rare and at-risk plant species.

In most cases, common names are used throughout this document to identify a species. Exceptions include pest species and species for which there is taxonomic uncertainty or when common practice is to use a form of the scientific name as the common name; in those instances, the scientific name may be used to identify the species. Scientific names for all plant SGCN are provided in Appendix PA-2.

### 3.15.1.1 Federal Regulations

One of the most important protective measures for conservation is the Endangered Species Act (ESA) of 1973, designed to protect and recover endangered and threatened species of fish, wildlife, and plants within the United States and its territories. Currently, there are 27 plant species known to occur in North Carolina that are listed by the U.S. Fish and Wildlife Service (USFWS) for federal protection under the ESA (USFWS 2021a). Appendix PA-2 provides a list of all SGCN plants and their current NC and federal protection status. All ESA protected plant species found in the state have recovery plans (USFWS 2021b).

The Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) is an agreement between international governments to protect wild plants and animals from becoming threatened or endangered from international trade (CITES 1975). The United States is a participating member nation. Protection is afforded through listing of a species in one of three lists, or appendices (CITES 2021).

- Appendix I provides the highest protection, limiting any trade of a species on the list only to exceptional circumstances because they are threatened with extinction.
- Appendix II controls trade of species that are at higher risk when trade could be incompatible with their survival.
- Species included in Appendix III are protected in at least one country that is party to the convention and CITES has been asked for assistance in controlling trade of the species.

There are 15 plants identified as SGCN that are included in CITES Appendix II; four are in the Order *Nepenthales* and 11 are in the Order *Orchidales*. There are no other plants from North Carolina listed in other CITES appendices.

### 3.15.1.2 State Regulations

The N.C. Nature Preserves Act enacted in 1985 (NCAC 1985: a.2 c.143B §49-§135.273) allows the State to obtain and dedicate land as permanently protected nature preserves. North Carolina's Department of Agriculture and Consumer Services, Plant Conservation Program (PCP) was authorized by the Plant Protection and Conservation Act (NCAC 1979: a.19B c.106 §202.12-§.202.22) to manage plant conservation in the State including adopting a state list of protected plant species, adopting and enforcing regulations that protect, conserve, and enhance those listed species, and developing conservation programs for the benefit of listed species. The PCP is responsible for managing more than 14,500 acres of conservation preserve properties across the state (Friends of Plant Conservation 2021). These preserves provide critical conservation for about 18% of the listed plant species in North Carolina. Additional plant protection is provided by legislation that protects land from criminal trespass (NCAC 2014: a.22 c.14 §126-§159.4) and prohibits taking of certain wild plants from private or public land without a permit issued by the owner.

### 3.15.2 Evaluation and Identification of Plant SGCN

As noted in Section 3.1.2 in the 2015 NCWAP, conservation priorities need to consider the greatest variety of biological diversity possible to ensure species survival and viable ecosystem services. Similar to methods used by the taxonomic Scientific Councils convened by the Commission's Nongame Wildlife Advisory Committee, the PCP convenes a Scientific Committee to evaluate, identify, and recommend plant species that need protection through state listing. The evaluation process considers the rarity, threats, and short-term trends of every species tracked by the NCNHP. The methodology involves broad participation by species experts and provides opportunities for public input through a 60-day comment period. The species evaluation process and a list of participants involved in developing and implementing the evaluation process are described in a white paper provided in new Appendix R.

### 3.15.3 Conservation Concerns

Most at-risk plants in North Carolina are endemic species and species with small, isolated populations limited to narrow distributions in insular and highly fragmented habitats (Cartwright 2019). As part of the PCP Scientific Committee's evaluations, a threats analysis is performed for plant species which considers each population as a discrete unit. In this way the viability of each population is considered by the Committee and the overall species' viability is assessed by reviewing the status of the populations within the state. It is understood that some imperiled or rare species in North Carolina might be more common elsewhere; however, each

species' viability within the state is considered at face-value in the interest of maintaining our state's biodiversity.

For species with very small populations, the long-term viability is highly questionable. Small populations tend to suffer from genetic loss which can lower the overall fitness at the population and even species level within a region. By tracking population viability, the NCNHP's database of rare plant populations helps conservationists to prioritize species and populations within species' ranges which are at elevated risk of loss unless population sizes increase. Conservation efforts that support population increases often requires mitigation of more than one threat.

Historical populations of rare species continue to be tracked by NCNHP for two primary reasons. First, historical populations can help us understand the full range and distribution of species as they undergo losses or range changes. Second, it is possible that historical populations can be rediscovered at or near known records during future surveys when environmental conditions are suitable. Most often these rediscoveries occur after appropriate land management is conducted to rehabilitate the habitat at a site, but sometimes a resurvey simply turns up previously undetectable individuals for unknown reasons.

#### **3.15.4 Knowledge Gaps**

Beginning in 1982, the NCNHP's county inventory biologists systematically studied the ecology of each county, conducting biological inventories of natural areas and maintaining a database of high-quality natural communities and rare species occurrences. Since the first county inventory was complete (Dare mainland), 97 of North Carolina's 100 counties have been comprehensively inventoried by NCNHP biologists (only Clay, Swain, and Wilkes have not been completed as of 2021). After completion of the initial county inventories, biologists in the NCNHP and partners including Wildlife Resources Commission, Division of Parks and Recreation, and Plant Conservation Program and many others, update the state's natural heritage inventory regularly as new lands are acquired for conservation and through partnership monitoring efforts. However, even with the collaborative efforts of field biologists working across North Carolina, many species and habitats remain under surveyed due to lack of staff resources or difficulty of access. For this reason, some species are considered "data deficient" and were not included in the SGCN priority list. An ongoing need exists for additional surveys and monitoring of species included in the SGCN list to keep the dataset current and complete, as circumstances change due to natural processes and human impacts to the landscape.



Populations that have not been inventoried in more than 30 years (on average) are considered “historical”. Where species occur in rapidly developing urban areas, species may be considered “historical” if they have not been observed in greater than 20 years. This difference is due to the likelihood of local extirpation caused by habitat conversion.

The NCNHP and partners obtain permission from landowners before conducting any biological inventories on private land. In many areas, staff biologists recognize the high likelihood of rare species or natural community occurrences on private land where they are unable to obtain survey permission, these areas represent knowledge gaps in the dataset (data deficiencies).

### 3.15.5 Threats and Problems

The threat assessment tool used to develop the plant SGCN list helps to assess the conservation needs of an individual species, and also identifies the greatest threats across all the reviewed species. The PCP has identified the following as the top threats to rare plants in North Carolina: natural system modifications (i.e., incompatible land management and hydrological alterations), residential and commercial development (i.e., habitat loss), invasive and other problematic species and genes, and stochasticity. Apart from stochasticity, these threats are defined in Salafsky et al. (2008).

The most important threats relate to habitat loss and habitat degradation. This is not surprising considering the stationary nature of plants, especially relative to most other taxonomic groups. Not surprisingly, these threats are particularly impactful in North Carolina given the state’s long history with agriculture and other land-use intensive industries, as well as its recent and ongoing rapid development and growth. By fragmenting landscapes and damaging natural communities and natural processes, natural areas that are not directly disturbed can face secondary or indirect impacts from nearby habitat losses. Further, habitat fragmentation can disrupt or diminish the connectivity between remaining habitats which can cause populations to be isolated, leading to genetic diversity losses.

Additional noteworthy threats identified for plants in our state include trampling and disturbance caused by recreation activities. Related to this threat are over-collection and exploitation which is an uncommon but a very impactful threat where it occurs. Another concern is climate change and related extreme weather events (e.g., drought, wind damage, flooding, excessive heat, and seasonal norm variations).

Importantly, the worst threats that plants are facing are not easily mitigated by rules or regulations. Instead, habitat conservation, habitat restoration, and population level management are the most important strategies for mitigating threats to plants.

### 3.15.6 Management Needs

Management needs for rare species are directly linked to the threats faced by those species. In order to address an overarching threat like habitat loss, protection from development (both direct land conversion and indirect encroachment) is key. Habitat degradation is often followed by habitat destruction. Therefore, many of North Carolina's most important plant habitats need protection from land conversion or development. Management activities need to include mitigation of both on-and off-site threats and restoration of previous damages. Thus, it is possible for several rare species living in similar habitats to have similar management needs, while some other species have varying management needs in different parts of their range. In other words, a management prescription depends on the threats and damages being addressed.

Despite habitats varying across North Carolina, land managers will likely find themselves addressing one or more of the following management needs, regardless of their location.

- Fire suppression is one of the largest threats to North Carolina's plant species and thus, prescribed fire is recommended to mitigate woody encroachment and other impacts of fire suppression. Careful planning is needed not only for safety, but also to obtain the best outcomes from each fire. For instance, to reduce competing vegetation, the timing of prescribed burns (season and interval) is important.
- Although prescribed burning is a supported and growing practice in our state, the need for prescribed fires is greater than what can be met with existing resources. Understanding what other management practices can be used as fire surrogates will be increasingly important as these and other constraints limit the use of fire as the primary management tool in areas where fire is needed.
  - Climate change is lengthening the natural wildfire season in our region and elsewhere in the country. The direct and indirect impacts of this longer season result in personnel and resources needed for prescribed burning being deployed to containment and suppression efforts, effectively shortening the prescribed fire window of opportunity due to lack of available resources.
  - Climate change is also leading to more extreme weather which is further reducing the number of "good burning days" available to fire practitioners.
  - Lastly, increasing development, as discussed earlier, is greatly increasing the wildland-urban interface which adds additional safety and sensitivity concerns to

prescribed fire planning in these areas, further limiting the opportunities to conduct effective burns for habitat management.

- Invasive species control is needed in nearly every disturbed site. The various forms of habitat degradation mentioned before each cause inroads for invasive species to colonize, especially in areas where the natural community matrix has been disturbed. Managing invasive species should be equal parts avoidance, control, and eradication of existing infestations.
- Hydrological alterations are also very common forms of habitat degradation but may be the most challenging and least straight-forward threats to address, especially alterations related to climate change such as sea level rise and saltwater intrusion. Understanding the hydrological needs of a species or community is critical to managing for such conditions. In areas with alterations, consider options that restore historic stream flow and capacity for maintaining surface and groundwater levels.
- Right-of-way maintenance is unique compared to natural areas and brings with it a specialized set of management considerations. For one, these areas can simultaneously be highly altered and provide important habitat, especially for sun-loving plant species easily out-competed by surrounding vegetation. Appropriately timed mowing regimes can be highly effective at managing a wide variety of plant habitats in rights-of-way. However, increasingly, rights-of-way are being maintained with herbicide instead of mowing for generalized maintenance focused on human uses (e.g., maintaining visibility in road shoulders and avoiding hazards in powerlines).

### 3.15.7 Additional Information

There has been a longstanding disconnect between the documented conservation needs for plant species and the disproportionately low funding and support for the recovery of rare, at-risk, and imperiled species. In a review of species listed under the Endangered Species Act, plants vastly exceed all other taxonomic groups in number of species listed but represent the lowest investment per species compared to all other taxonomic groups (Negron-Ortiz 2014). Making additional resources available for conserving these unique and foundational components of our natural world should be a higher priority. With the increase in North Carolina's human population and the rapid pace of land use change over the past 20 years often resulting in habitat destruction and degradation, the need for plant and wildlife habitat conservation and management is more urgent than ever. The need for funding, staff, and public support cannot be overstated.

### 3.15.8 Recommendations

**Surveys.** Distributional and status surveys need to focus on plant species believed to be declining or mainly dependent on at-risk or sensitive natural communities. According to the NC Risk Assessment and Resilience Plan (NCDEQ 2020) some habitats considered most at risk – and therefore most in need of monitoring – include:

- Low-lying areas along the coast are vulnerable to sea-level rise impacts including coastal erosion, saltwater intrusion, and storm surge. These habitats include Freshwater Tidal Wetlands, Maritime Wetland Forests, Blackwater Floodplains, and Large River Systems.
- High elevation natural communities are vulnerable to climate change. Even though many of these sites are already in conservation ownership, changes in seasons, extreme heat, drought, and heat waves all affect plants and animals that were adapted to live in conditions unique to the high elevation mountaintops. These changes are most likely to affect High Elevation Cliffs and Rock Outcrops.
- Wetland habitats dependent upon frequent fire are vulnerable to any changes in land use or landscape context that result in fire suppression or changes in hydrology. These threats affect Wet Pine Savannas in the Sandhills and Coastal Plain.
- Freshwater aquatic systems – already impacted by pollution, sedimentation, and obstructions due to dams and culverts – are also vulnerable to climate changes such as changes in water temperature and precipitation amounts as well as flows brought about by heat waves and extreme heat. These threats affect aquatic communities across the state.
- Rare plant and animal species occurring in all the habitats listed above should be routinely surveyed to facilitate early detection of declines due to habitat changes. Management intervention, if feasible, should be considered where needed to avoid local extirpation.

**Monitoring.** Long-term monitoring is critical to assessing species and ecosystem health over time and gauging the resilience of organisms to a changing climate. Studies should identify population trends, as well as assess impacts from conservation or development activities. These efforts will inform species and habitat management decisions. Long-term monitoring sites need to be identified and monitoring protocols developed for all priority plant species. Monitoring plans should be coordinated with other existing monitoring programs where feasible.

- At the site or population level, monitoring activities should include annual (or regular) observations of area of occupancy with an emphasis on changes in this area (both contractions and expansions), relative vigor (often recorded as the reproductive proportion of the population), and notable concerns such as disease or other impacts.
- At the species level, monitoring activities should help describe or calculate short-term trends for several populations. This level of monitoring often involves demographic data collection and can be very time and resource intensive.

**Research.** Research topics that facilitate appropriate conservation actions include natural community preferences, fecundity, population dynamics and genetics, propagation and transplant methods for the most imperiled species, and food web dynamics. Increased understanding of life histories and population statuses helps determine the vulnerability of priority species to further imperilment, in addition to identifying possibilities for improved management and conservation. All studies should provide recommendations for mitigation and restoration.

**Management Practices.** Management practices that reduce impacts and work synergistically with other conservation actions are needed to enhance the resilience of natural resources. Particular needs include preserving biodiversity, protecting native populations and their habitats, maintaining and restoring natural processes such as fire and natural flood regimes, and improving degraded habitats. There is a need for more understanding of how management practices conducted at varying scales impact plant populations. For instance, some practices should be employed in very controlled and isolated applications (i.e., herbicide treatments), whereas other practices are more effective if applied across a larger landscape (i.e., prescribed burns). Factoring in the feasibility of employing the best management practices at the most appropriate scale is a critical component in management planning, especially for rare plant species and sensitive habitats.

**Conservation Programs and Partnerships.** Conservation programs, incentives, and partnerships should be utilized to the fullest extent to preserve high-quality resources and protect important natural communities. Protective measures that utilize existing regulatory frameworks to protect habitats and species should be incorporated where applicable. Land conservation or preservation can serve numerous purposes in the face of anticipated climate change, but above all, it promotes ecosystem resilience.

North Carolina benefits from a robust conservation community and network of organizations involved in plant conservation. Some partners include North Carolina's Plant Conservation Program and Friends of Plant Conservation, Natural Heritage Program, Botanical Garden,



Division of Parks and Recreation, Forest Service, and Wildlife Resources Commission, as well as federal partners such as the US Forest Service, National Park Service, and Coastal Reserve Program. Universities also collaborate for research and education, especially the University of North Carolina system (Chapel Hill, Asheville, Appalachian State, NC State, Western Carolina, Wilmington), Duke University, and Catawba College. In addition, many land trusts and local governments monitor preserves for rare species and incorporate prescribed fire and wetland restoration into their practices. Groups such as the Plant Conservation Alliance and the Rare Flora Discussion Group play a role in fostering communication and collaboration among these many partners.

### 3.15.9 References

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# ADDENDUM 2

4

## Chapter 4 Habitats

### Piedmont and Coastal Plain Oak Forest

#### 4.4.19 Piedmont and Coastal Plain Oak Forest

##### 4.4.19.1 Ecosystem Description

Oak forests were once the most common natural community type in the Piedmont, occupying most of the uplands. In the Coastal Plain they were much more limited, especially in areas farther south. They occur primarily in dissected areas such as stream bluffs but may also occur on low upland ridges within large floodplain terraces or swamps. Soils are usually acidic, but on unusual types of rock, such as diabase and gabbro, they may be circumneutral. Piedmont and Coastal Plain oak-hickory forests are generally dominated by white oak in combination with post, red, southern red, or black oak species.

Hickories are generally the second most diverse genus in the canopy, but pines, maples, tulip poplar, or other hardwood species may be abundant. In less acidic examples, ash is often abundant. Large numbers of pine, tulip poplar, sweetgum, or red maple usually indicate a history of severe disturbance. The understory in these forests often consists of red maple, sourwood, black gum, and flowering dogwood. In acidic sites, species of blueberry or huckleberry can form a substantial shrub layer. Herbs are generally sparse and low in diversity at present; they were more abundant and diverse when fire was a regular occurrence.

Natural oak—hickory forests can be categorized into eight community types based on canopy composition, moisture levels, and soil chemistry, as well as biogeography. The first two community types are the most abundant, and some of the others are rare.

- **Dry Oak—Hickory Forests** were once one of the predominant forests of the Piedmont, occurring on drier upper slopes and on the broad upland ridges where acidic soils are present. In the Coastal Plain they are scarce and limited to dry upper slopes of bluff systems. White oak, in combination with post oak or southern red oak, dominates the canopy in more natural examples, and hickories and shortleaf pine are commonly associated. Dry Oak—Hickory Forests were probably once the most extensive forests in the Piedmont. Although they remain one of the most common community types, extensive agriculture and land development on the flat uplands has reduced them by a greater proportion than most other community types. Very mature examples are uncommon, and old-growth examples are unknown. Coastal Plain examples are rare.
- **Dry—Mesic Oak—Hickory Forest** communities occur on slightly more moist areas, on slopes and rolling uplands. They typically have white and red oaks as the primary

associates, with black oak and sometimes scarlet oak present along with hickories and shortleaf pine. They remain one of the most abundant community types in the Piedmont but have been reduced by a great proportion from their past extent. Very mature examples and large unfragmented examples are uncommon. Examples of Dry—Mesic Oak—Hickory Forest are rare in the Coastal Plain, though more abundant than Dry Oak—Hickory Forest.

- **Dry Basic Oak—Hickory Forest** communities occur on rocks such as gabbro and diabase that produce less acidic soils. They occur on upper slopes and upper flats with similar moisture levels as Dry Oak—Hickory Forests. They are dominated by white oak in combination with post or southern red oak, but usually have abundant hickories, including less common species such as shagbark and southern shagbark. Ash is also usually common and shortleaf pine is often a component. Distinctive species of trees, such as redbud and chalk maple, may predominate in the understory, and viburnums, coralberry, or Carolina buckthorn are often more common than blueberries in the shrub layer. These communities have suffered losses from their past extent that are comparable to those of Dry Oak—Hickory Forest, but because their substrates are much less common, remaining examples are scarce.
- **Dry—Mesic Basic Oak Hickory Forest** communities occur on substrates such as gabbro and diabase in settings with moisture levels similar to Dry—Mesic Oak—Hickory Forest. The canopy is dominated by white oak and red oak, in combination with hickories that often include shagbark and southern shagbark, as well as ash, shortleaf pine, and sometimes southern sugar maple. The distinctive understory and shrub species found in Dry Basic Oak—Hickory Forest are often present. Additionally, species typical of mesic and floodplain communities, such as spicebush and dwarf buckeye, as well as a number of herbaceous species, may occur farther uphill in these communities.
- **Piedmont Monadnock Forests** occur on scattered erosional remnant hills that stand above the surrounding uplands because they are more resistant to erosion. The substrate is rocky and soil conditions dry. These communities are dominated by chestnut oak, a species that is common in the mountains but otherwise uncommon in the Piedmont. Shortleaf pine may be codominant. White, post, southern red, and scarlet oaks may be present in small numbers, but often chestnut oak makes up nearly all the canopy. These communities are restricted and are unlikely to migrate. Their extent probably will stay the same, but some aspects of the communities may change.



Monadnock sites tend to be dry. Increased dryness might stress chestnut oaks, but it is unclear how serious this is; they do not appear to be limited by moisture at present. The shortleaf pine component may increase, particularly if there is more fire. Most species will probably persist but those that are confined to monadnocks or other small patches of habitat may be vulnerable to increased perturbations, such as fire, if their entire block of habitat is affected by any one event.

- **Xeric Hardpan Forests** are rare Piedmont communities that are intermediate between oak-hickory forests and glade or barrens habitats. They occur on upland flats where soils high in shrink-swell clays interfere with water penetration and root growth. Most are on diabase or gabbro and have species typical of the less acidic conditions, but an even rarer subtype occurs on acidic shales. The distinctive soil properties produce conditions that appear drier than Dry Oak—Hickory Forest, drier than the climate of North Carolina would suggest. Nevertheless, these communities are often associated with Upland Depression Swamp Forest communities. The canopy is dominated by some of the most drought tolerant species in the state, post oak and blackjack oak, and in mature stands the canopy is somewhat open. With the persistent fire regime that once prevailed across the Piedmont, these forests would be more open, appearing as woodlands or savannas, perhaps with open prairie patches on the most extreme soils. While dense brush is often found beneath the open canopy now, these communities presumably were once open and grassy beneath. Numerous plants that need full sunlight are present in canopy openings and along maintained edges such as roadsides and powerline corridors in areas where Xeric Hardpan Forests occur. Drought will likely shift them to more open structure that resembles their natural condition, perhaps even without increased fire.
- **Mixed Moisture Hardpan Forest** communities are dominated by a mixture of tree species typical of hydric and xeric conditions, occurring on sites with clay-rich soils that have restricted internal drainage or shrink-swell properties. Typically, willow oak is mixed with white oak, post oak, or southern shagbark hickory as the predominant canopy. Mixed Moisture Hardpan Forest is distinguished by the co-occurrence of wetland and upland oak and hickory species, generally including both willow oak and post oak in significant numbers, without segregation into distinct Xeric Hardpan Forest and Upland Depression Swamp communities. The site generally shows evidence of shallow ponding of water but not water flow. Mixed Moisture Hardpan Forests occur on unusually flat upland areas of the Piedmont, generally associated with diabase, gabbro,

or other mafic rock but potentially with clay-rich metasedimentary rocks. Communities with comparable mixtures of wet and dry soil conditions and of wetland and xerophytic plants are found in other parts of the Southeast and are sometimes known by the term “xerohydric.”

- **Swamp Island Evergreen Forests** are rare communities of the Coastal Plain upland ridges on floodplain terraces, where they are generally surrounded by wetlands. They are evergreen hardwood or mixed communities containing species that otherwise, in North Carolina, occur only in the maritime forests of the coast. They are dominated by sand laurel oak, loblolly pine, and often live oak, dwarf live oak, or water oak. Another species typical of maritime conditions is wild olive. Natural isolation from fire is thought to be an important determinant of these communities. All known examples are associated with medium to large blackwater rivers. This community is known only in the southern part of the Coastal Plain, associated with the Lumber, Waccamaw, and Northeast Cape Fear rivers and their large tributaries such as Juniper Creek and Big Swamp.

Three landscape habitat indicator (LHI) guilds have a significant concentration in these ecosystems. These are the Piedmont dry—wet hardwood and mixed forest, Piedmont dry—wet basic hardwood forest, and dry-xeric mixed forests, woodlands, and barrens. Habitat for the dry—xeric mixed forests, woodlands, and barrens LHI guild may increase with higher frequency of drought and fires. Habitat trends for the Piedmont dry—wet hardwood and mixed forests and Piedmont dry—wet basic hardwoods forests LHI guilds are more difficult to predict but given the wide range of moisture conditions they occupy, they are likely to remain fairly common.

#### 4.4.19.2 Location of Habitat

Most Oak—Hickory Forests in the Piedmont are found on upland slopes and ridgetops, while Coastal Plain examples are found on dissected slopes of stream and river bluffs. Xeric Hardpan Forests occur on flat to gently sloping uplands while Piedmont Monadnock Forests occur on isolated higher hills. Basic Oak—Hickory Forests, Xeric Hardpan Forests, Mixed Moisture Hardpan, Swamp Island Evergreen, and Piedmont Monadnock Forests were always minority community types because of their need for specialized sites. The rocky monadnocks escaped impacts from farming, though development, clearcutting, and other alterations have eliminated the natural character of many communities.

Examples of Piedmont and Coastal Plain oak forests can be found on several public lands, including Caswell Game Lands, William B. Umstead State Park, Morrow Mountain State Park, Uwharrie National Forest, and Croatan National Forest.

#### 4.4.19.3 Problems Affecting Habitats

The greatest threats to remaining examples of oak-hickory forests are destruction and degradation associated with development and conversion to successional forests by logging. While all remaining oak-hickory forests regenerated after past logging, present-day harvests often result in regeneration by species other than oaks. Conservation of the best examples and areas important to landscape connectivity is the most important action needed for this habitat.

As with other formerly widespread community types, fragmentation is a concern. Past and ongoing land use changes associated with development not only reduce the extent of habitat but leave remaining oak—hickory communities as isolated patches. While this habitat remains common and most of its component species are widespread, most natural oak-hickory forests are on dissected landscapes comprised of multiple community types and are not extensive. While most component species are abundant and widespread, some species, particularly mammal and bird species, may only be able to persist in large areas or they may be excluded from areas near the forest edge. The chances for some of these animals to survive may be enhanced by protecting forested connections between larger forested blocks.

Fire is believed to have been a natural part of all Piedmont and Coastal Plain oak forests. While its frequency and importance are not precisely known, regular fires give a competitive advantage to oaks, hickories, and shortleaf pine relative to most other tree species. There is now much concern that these species are not regenerating. Other species are much more abundant in forest understories and are increasing in the canopy. Harvests that once resulted in regeneration of oaks now often lead to stands of other species. Fires also lead to more open canopy conditions and greater cover and diversity of herbs. Low intensity fires would be beneficial but intense wildfires can be destructive. Regular fires also reduce fuel loads and reduce the potential for catastrophic canopy-killing fires. The restriction of oak forests in the Coastal Plain to fire-sheltered sites suggests a need for fires to be less frequent than in the longleaf pine communities that occupied the uplands. The Xeric Hardpan Forests appear to have changed most with removal of fire, but fire probably had similar, if less dramatic, effects on the other community types. Most or all rare plants in this group are likely to benefit from fire and the habitat conditions it creates.

The occurrence of invasive and non-native plants is a problem for oak—hickory forests in some places and is likely to continue to spread. Princess tree and tree-of-heaven can invade disturbed areas and occupy canopy gaps in some places. Autumn olive has come to dominate the shrub layer in some forests, and species such as trifoliolate orange represent a potential threat. Several herbaceous exotic plants also invade these forests, particularly those with basic soils. It is unclear if a warmer climate will exacerbate their spread; however, increased canopy disturbance by wind, drought mortality, or severe fire will hasten the spread of invasive species.

Most oak forests are tolerant of drought. Increased occurrence or longer periods of drought may favor oaks relative to weedy mesophytic species, but increased wind damage favors the understory species. If drought leads to severe wildfires, it would be harmful to oak forests, but the ease with which fires may usually be controlled in them makes this unlikely. Increased wind throw would probably favor existing understory maples over the long-lived oaks. Older trees will withstand fire better than younger ones but will be more susceptible to wind. Increased wind throw would reduce the average longevity of trees. The most severe droughts and hot spells of recent record have had only limited effects on oak forests. These forest types occupy the driest places on the Piedmont landscape. In general, the effects of drought, fire, and storm winds are small relative to the effects of development and logging.

#### **4.4.19.4 Climate Change Compared to Other Threats**

Climate change is far from the most significant threat to Piedmont and Coastal Plain Oak Forests. Similar oak forests range well to the south of North Carolina where conditions are similar to predicted future climate conditions. Direct effects of the warmer climate on these communities are likely to be limited and may even reduce some of the increase in mesophytic species. If fires increase, this may be beneficial, but an increase in intense fire would be harmful. Most fire that will occur will be from controlled burning, but weather conditions that make burning more difficult will be detrimental as it limits application opportunities. Most or all rare plants in this group are likely to benefit from more canopy openings and more fire.

**TABLE 4.43 Comparison of climate change with other threats to Piedmont and Coastal Plain oak forests**

Threat	Rank Order	Comments
Development	1	The extensive examples in the Piedmont and the more limited range examples in the Coastal Plain continue to be rapidly destroyed by ongoing urban, suburban, rural, residential, and commercial development. Continued population growth makes this the most severe threat in the current and the future climate. However, the fragmentation and loss of extent will increase the alteration caused by climate change, as isolated communities are unable to migrate, and species are unable to move to more favorable sites.
Extractive Uses/ Timber Harvest	2	Typical past logging practices, both high-grading and clearcutting, have had negative impacts on forest structure and composition, often converting oak forest to other types. Incentives for logging practices geared toward restoration rather than purely short-term financial objectives will reduce (but not eliminate) the negative impacts of logging. While many examples harvested in the past regenerated as oak forests, many harvested at present become dominated by successional pine, maple, or other hardwoods and it is unclear if oak dominance will return. The loss of old trees caused by increased disturbance coupled with future climate conditions will exacerbate impacts caused by timber harvest. Demand for biofuels may reduce timber rotations and may provide incentives to harvest additional areas that have not been commercially viable.
Invasive Species	3	Tree-of-heaven, princess tree, autumn-olive, and other invasive plants are likely to continue to expand regardless of the climate. A number of smaller invasive plants are increasing in disturbed oak forests and pose a risk of increase. Emerald ash borer is a severe threat to the ash component of Dry and Dry—Mesic Basic Oak—Hickory Forest. Exotic diseases, such as the sudden oak death fungus, represent a severe potential threat even under the current climate. Increased drought may make forests more susceptible to other diseases and pests.
Fire Suppression	4	The threat posed by fire regime alteration is less certain in rank. Lack of fire is causing slow changes in composition, including reduced oak regeneration. The growth of dense shade-tolerant understories and the consequent failure of oaks to regenerate is

Threat	Rank Order	Comments
		likely a result of prolonged fire suppression. It is an ongoing problem regardless of climate change. Climate change may exacerbate it; if it makes controlled burning more difficult, but ongoing development and population growth has a much greater effect. Wildfires are likely to remain easy to control in the Piedmont.
Climate Change	5	In the future climate, there may be an increase in natural fires (due to increased drought and higher average temperatures), but landscape fragmentation and fire suppression practices likely will continue to prevent most fires from spreading very far in the Piedmont and in the dissected lands where oak forests occur in the Coastal Plain. Most oak forests are expected to benefit from increased fire frequency, as long as the fire intensity is not too high. Direct effects of the warmer climate on these communities are likely to be limited. Similar oak forests range well to the south of North Carolina. The most severe droughts and hot spells of recent record have had only limited effects on them because they occupy the driest places on the Piedmont landscape.

**4.4.19.5 Impacts to Wildlife**

Rare species of animals, primarily insects, associated with these natural communities occupy habitats at the dry to xeric extreme, with some occurring only on a few isolated monadnocks in the Piedmont. Species that are confined to monadnocks or other small patches of habitat may be vulnerable to increased perturbations, such as fire, if their entire block of habitat is affected by any one event. Species confined to isolated habitats are unlikely to respond to climate change by migration.

Lists of wildlife SGCN and other priority species for which there are knowledge gaps and management concerns are provided in Appendix G of the 2015 Plan. Plant SGCN that are associated with this habitat type are identified in a new table provided in Appendix HA-2.



#### 4.4.19.6 Recommendations

To reduce the possible impacts from habitat fragmentation, fire suppression, and climate change, conservation or restoration of landscape connections is most important for Piedmont and Coastal Plain Oak Forests. Although oak forest habitat remains abundant and widespread, because of the rapid land development and conversion, the most critical conservation activities revolve around securing land from these activities. Other needs include gathering information about the habitats themselves but also the wildlife species that utilize these habitats, and the unique plants associated with them. Management of these habitats can be better informed by continuing to develop techniques for safe and beneficial controlled burning.

**Surveys.** Distributional and status surveys need to focus on species believed to be declining or mainly dependent on at-risk or sensitive natural communities.

- Give priority to gathering baseline information regarding the current distribution and status of oak forest-associated species that are rare or declining (e.g., Eastern Fox Squirrel, Timber Rattlesnake, several bat species, Schweinitz's Sunflower, Dwarf-flowered Heartleaf, Georgia Aster).
- Expand surveys to include species for which we know very little about current status and distribution (e.g., Whip-poor-will, weasels, moles, shrews, bats, certain salamanders, and reptile species such as the Eastern Box Turtle).

**Monitoring.** Long-term monitoring is critical to assessing species and ecosystem health over time and gauging the resilience of organisms to a changing landscape and changing climate. These efforts will inform future decisions on how to manage species and their habitats. Studies should identify population trends and assess impacts from conservation or development activities. Long-term monitoring sites need to be identified and monitoring protocols developed for all priority species. Monitoring plans should be coordinated with other existing monitoring programs where feasible.

- Track oak habitat trends (e.g., rate of loss or conversion of the habitat and disease or pest affects) and consider trends in the development of long-term monitoring strategies for oak forests of the region.
- Track the effects of fire on species in these habitats, especially rare and poorly understood species.

**Research.** Research topics that facilitate appropriate conservation actions include habitat use and preferences, reproductive behavior, fecundity, population dynamics and genetics, feeding, competition, and food web dynamics. Increased understanding of life histories and status helps assess the vulnerability of priority species to further imperilment. It also aids in identifying possibilities for improved management and conservation.

- Study population responses of plant and wildlife species to habitat restoration and management (large scale prescribed burning, woodland/savanna restoration, etc.).
- Study population responses of plant and wildlife species to habitat fragmentation and degradation to better inform managers and plans.

**Management Practices.** Management practices that reduce impacts and work synergistically with other conservation actions are needed to enhance the resilience of natural resources. Particular needs include, preserving biodiversity, protecting native populations and their habitats, and improving degraded habitats.

- Foster efforts to understand and implement appropriate management techniques (e.g., prescribed fire or thinning) for the benefit of the broadest array of oak forest-dependent wildlife while considering specific needs of wildlife with more restrictive requirements (Artman and Downhower 2003; Ford et al. 2000).
- Manage existing conservation lands by using prescribed burning to diversify structure and composition of forest understory. Protect older trees, which may become increasingly scarce with increased wind disturbance. Provide an array of age classes by managing for uneven-aged stands rather than a patchwork of even-aged stands.

**Conservation Programs and Partnerships.** Conservation programs, incentives, and partnerships should be fully utilized to preserve high-quality resources and protect important natural communities. Protective measures that utilize existing regulatory frameworks to protect habitats and species should be incorporated where applicable. Land conservation or preservation can serve numerous purposes in the face of anticipated climate change, but above all, it promotes ecosystem resilience.

- Work with partners including the NC Prescribed Fire Council, the Fire Learning Network, and NC Forest Service to reinstate and increase prescribed burning.

- Support efforts to create wildlife passages along highways and protect undeveloped connections. These provide safer movement between oak—hickory habitats fragmented by highways. Protecting the connections will preserve cover and food resources provided by these habitats.
- Identify and protect strategically important areas, especially in areas that harbor populations of SGCN.

### 4.4.19.7 References

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# **ADDENDUM 2**

CA-2

## **Key Participants and Letters of Acknowledgment and Support**

### **Key Participants**

#### **WAP Coordinator**

Cindy Simpson, Habitat Conservation Division, NCWRC

#### **Partners**

Misty Buchanan, Director, NC Natural Heritage Program  
Lesley Starke, Program Manager, NC Plant Conservation Program

#### **WAP Steering Committee**

David Cobb, Research Program, NCWRC  
Shannon Deaton, Habitat Conservation Division, NCWRC  
Todd Ewing, Aquatic Diversity Program, NCWRC  
Lane Sauls, VHB Engineering and NCWRC Nongame Wildlife Advisory Committee  
Sara Schweitzer, Wildlife Diversity Program, NCWRC

## WAP Technical Team

NCWRC staff responsible for developing the technical contents of the Wildlife Action Plan, with a focus on priority species, priority habitats, threats, integrating climate change impacts, and recommended conservation actions. The Team convened work groups as needed.

Greg Batts  
Chris Dawes  
Kevin Dockendorf  
Luke Etchison  
Michael Fisk  
Joe Fuller  
Chris Goudreau  
Jeff Hall  
Brena Jones  
Chris Jordan

Philip Lucas  
Jeremy McCargo  
Allison Medford  
Jake Rash  
TR Russ  
Nick Shaver  
Vann Stancil  
Kendrick Weeks  
Brent Wilson



Roy Cooper  
Governor

D. Reid Wilson  
Secretary, Department of Natural and Cultural Resources

Will Summer  
Director, Division of Land and Water Stewardship  
Executive Director, NC Land and Water Fund

March 11, 2022

Ms. Cindy Simpson  
North Carolina Wildlife Resources Commission  
1721 Mail Service Center  
Raleigh, NC 27699-1721  
RE: NC Wildlife Action Plan Addendum 2 - Plant SGCN

Dear Ms. Simpson:

North Carolina's Natural Heritage Program supports all of the 2022 revisions to the NC Wildlife Action Plan included in Addendum 2, related to adding plants to the list of Species of Greatest Conservation Need (SGCN). Including plants and plant habitat in North Carolina's Wildlife Action Plan will help inform and support conservation strategies, decision-making, and sustainable action for rare and threatened plants and their habitats.

The plant species included in Addendum 2 are listed in the NC Protected Plant List, with a status of Endangered, Threatened, Special Concern-Vulnerable, or Special Concern-Historical. These designations were developed by the North Carolina Department of Agriculture & Consumer Services' Plant Conservation Program (NCPCP) staff, working closely with North Carolina's Natural Heritage Program, the NCPCP Scientific Committee, and published in the NC Administrative code (02 NCAC 48F .0300), amended effective May 1, 2021. These represent the most imperiled plant species in North Carolina, with verifiable data demonstrating threats and trends.

Including plants as SGCN will increase awareness of plant conservation; provide more consistent information for planning, conservation, and land management across state agencies; and help inform conservation and inventory priorities. We believe it will also encourage research, restoration, outreach, and leadership efforts for plant conservation. We appreciate and support this opportunity to collaborate with the NC Wildlife Resources Commission, NC Plant Conservation Program, and US Fish and Wildlife Service for conservation of wildlife, plants, and habitat in North Carolina.

Sincerely,

A handwritten signature in black ink that reads "Misty Buchanan".

Misty Buchanan, Deputy Director for Natural Heritage  
Division of Land and Water Stewardship





**Dr. Bill Foote**  
Director

**Joy A. Goforth**  
Plant Pest Administrator

**Brian D. Bowers**  
Seed and Fertilizer  
Administrator

**Steven W. Troxler**  
Commissioner

North Carolina Department of Agriculture  
and Consumer Services  
*Plant Industry Division*

March 11, 2022

Ms. Cindy Simpson  
North Carolina Wildlife Resources Commission  
1721 Mail Service Center  
Raleigh, NC 27699-1721  
RE: NC Wildlife Action Plan Addendum 2—Plant SGCN

Dear Ms. Simpson,

The NC Plant Conservation Program is in full support of the 2022 major revision to the NC Wildlife Action Plan (Addendum 2) to include plants as Species of Greatest Conservation Need. This document is a critical conservation strategy for our state and the inclusion of plant species and plant habitats will be of benefit to the conservation and planning efforts across North Carolina.

The species list put forward in this major revision are listed under the NC Protected Plant List and have been vetted by the NC Plant Conservation Program and NC Natural Heritage Program and carefully reviewed by the NC Plant Conservation Program's Scientific Committee and NC Plant Conservation Board. This list was last updated in May 2021 and represents our best understanding of the plant species in the state which are in the greatest need of conservation action.

Each plant species included in this list represents an important part of our state's natural heritage. The interactions these species have with wildlife and other plants is critical to the overall health and resilience of the natural communities they reside in. Including plants in the overall conservation strategy for North Carolina will not only broaden the scope of conservation decision-making, we believe it will lead to improved conservation outcomes and strengthen partnerships among conservation organizations. Thank you for the opportunity to work on this project with you.

Sincerely,

Lesley Starke

NC Plant Conservation Program Administrator



## ◊ North Carolina Wildlife Resources Commission ◊

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Cameron Ingram, Executive Director

July 7, 2021

Paul Wilkes, Chief  
Division of Federal Assistance  
U.S. Fish and Wildlife Service  
1875 Century Boulevard, Room 240  
Atlanta, Georgia 30345  
[paul\\_wilkes@fws.gov](mailto:paul_wilkes@fws.gov)

Dear Mr. Wilkes:

The North Carolina Wildlife Resources Commission (Commission) is working in partnership with the N.C. Department of Agriculture and Consumer Services, Plant Protection Program (PCP), and the N.C. Department of Natural and Cultural Resources, Natural Heritage Program (NHP), to develop a plant list of Species of Greatest Conservation Need (SGCN). This letter is to notify you of the intent of the Commission to undertake an interim major revision to add the plant SGCN list to the 2015 N.C. Wildlife Action Plan (Plan) as Addendum 2.

This interim major revision will follow the guidance in the December 2017 U.S. Fish and Wildlife Service's (Service) memorandum for all States on Plan review and revision. The guidance defines a major revision as a significant change to the methods, criteria, or processes used to address any of the Eight Required Elements described in the approved Plan. We understand this Addendum 2 will require a formal review by a Regional Review Team (RRT) convened by the Service and a recommendation from the RRT for approval. You will recall that we submitted an Addendum 1 to your office and received approval in September 2020 and included minor revisions to 4 chapters.

Commission staff began working with the PCP and NHP on this major revision as of June 1, 2021 and anticipate submitting Addendum 2 of the 2015 Plan to the Service by January 2022. North Carolina's Addendum 2 will include the following additions and revisions:

- **Chapter 3: Species** - add a new Section 3.13 Plant SGCN  
Section 3.13 will include the methodology used to evaluate and identify protected plants, which are now considered plant SGCN in North Carolina. Priority conservation actions will also be provided in Section 3.13, following the same format for other taxonomic groups described in Chapter 3. The PCP manages the evaluation process and publishes

the list of protected plant species biannually. The N.C. Plant Conservation Board Scientific Committee and N.C. botanists have followed an established evaluation method to assess rarity, trends, and threats to native plant species found statewide and created a list of plant species for which there is the highest conservation concern. The protected plants evaluation includes public outreach and offers stakeholders an opportunity to contribute and comment on the results. The final list is approved by the N.C. State Legislature and is published in the N.C. Administrative Code (02 NCAC 48F.0300). The most recent list of plant SGCN was amended effective May 1, 2021.

- **Chapter 4: Habitats** - add plant SGCN associations as appropriate to each natural community  
This chapter provides information about important habitats for fish and wildlife. All plants listed as SGCN will be associated with one of the natural communities described in Chapter 4. Section 4.1.3 Species and Habitat Associations will also be revised to provide information about other natural communities and to introduce appropriate references for descriptions of natural plant communities found in the State. A table providing habitat associations for all plant SGCN will be added to a new Appendix HA2-1.
- Add a new **Appendix HA2-1** - All Plant SGCN Habitat Associations that provide natural community associations
- Add a new **Appendix PA-2** - a list of all Plant SGCN
- Add a new **Appendix R** - the North Carolina Protected Plant Species and Species of Greatest Conservation Need Evaluation Methodology white paper.

If you have any questions, please contact Cindy Simpson [cindy.simpson@ncwildlife.org](mailto:cindy.simpson@ncwildlife.org) or Shannon Deaton [shannon.deaton@ncwildlife.org](mailto:shannon.deaton@ncwildlife.org).

Sincerely,



Cameron Ingram  
Executive Director

cc: LeAnne Bonner, Federal Aid Coordinator, USFWS  
Kyle Briggs, Chief Deputy Director, NCWRC  
Shannon Deaton, Chief, Habitat Conservation Division, NCWRC  
Kate Pipkin, Operations Manager, NCWRC



# United States Department of the Interior

## FISH AND WILDLIFE SERVICE

1875 Century Blvd  
Atlanta, Georgia 30345



In Reply Refer To:  
FWS/WSFR/NC Plan

Mr. Cameron Ingram  
Executive Director  
North Carolina Wildlife Resources Commission  
1701 Mail Service Center  
Raleigh, North Carolina 27699-1701

Dear Mr. Ingram:

This letter is in response to your letter dated July 7, 2021 seeking U.S. Fish and Wildlife Service concurrence for the North Carolina Wildlife Resources Commission to begin a process of review to revise the North Carolina Wildlife Action Plan (Plan) by January 2022.

The Service appreciates your continued willingness to critically evaluate the current Plan, add plant species as Species of Greatest Conservation Need following a specified process, and revise associated sections in your Plan. You have proposed that this revision and related changes to the Plan should be considered a major revision. Based upon the current Plan revision guidance, the "Major Plan Revision" process involves seven steps:

- (1) The State Director notifies the Service Region by letter or email of intent to conduct a Major Revision.
- (2) The Service Region responds to the State via letter or email confirming or denying the Major Revision request. Appeals of the determination may be made in writing by a State Director to the Regional Director.
- (3) The State Director submits the modified Plan package to the Service Region. The package must include the following information as separate documents or as one combined document:
  - Summary of significant changes.
  - A "Road Map" that provides the locations of the Elements in the Plan, and describes how the current version of the Plan adequately addresses the Elements.
- (4) The Regional Review Team (RRT) reviews the Major Revision with input from WSFR and State staff and, following any dialogue between the parties, determines whether it meets the criteria to be approved or conditionally approved.
- (5) Upon recommendation of approval of a Major Revision by the RRT, the Regional Director or designee approves the Major Revision via letter or email to the State Director or designee.
- (6) The Service Region tracks and maintains an administrative record of Plan approvals.
- (7) Each State is encouraged to post an electronic version of its most recent Plan on its agency website with the summary of significant changes and the "Road Map."

We appreciate you notifying us early in this process and concur with your request. Please contact me at (404) 679-4154 or LeAnne Bonner at (404) 679-7357 if you have any questions.

Sincerely yours,

Digitally signed by PAUL WILKES  
Date: 2021.07.08 09:35:05 -04'00'

Paul A. Wilkes, Manager  
Wildlife and Sport Fish Restoration Program

# ADDENDUM 2

Plant SGCN

PA-2

**APPENDIX PA-2**

**Plant SGCN**

		Protection Status <sup>1</sup>		NatureServe Rank	
		Federal Status	State Status	Global Rank	State Rank
Scientific Name	Common Name				
<b>NONVASCULAR PLANTS (Lichens, Liverworts, Mosses)</b>					
<i>Acrobolbus ciliatus</i>	a liverwort		SC-V	G3?	S1
<i>Campylium stellatum</i>	Yellow Starry Fen Moss		SC-V	G5	S1
<i>Cetraria arenaria</i>	Sand-loving Iceland Lichen		SC-V	G4	S2
<i>Gymnoderma lineare</i>	Rock Gnome Lichen	E	E	G3	S3
<i>Hypotrachyna virginica</i>	Virginia Loop Lichen		SC-V	G1G2	S1S2
<i>Lejeunea blomquistii</i>	A liverwort		SC-V	G1G2	S1
<i>Lochocolea muricata</i>	A liverwort		SC-V	G5	S1
<i>Lophocolea appalachiana</i>	A liverwort		SC-V	G1G2Q	S1
<i>Sphagnum contortum</i>	Contorted Peatmoss		T	G5	S1
<i>Sphagnum warnstorffii</i>	Fen Peatmoss		SC-V	G5	S1
<b>VASCULAR PLANTS</b>					
<i>Acmispon helleri</i>	Carolina Prairie-trefoil, Carolina Birdfoot-trefoil		T	G3	S3
<i>Adiantum capillus-veneris</i>	Southern Maidenhair Fern (Venus Hair Fern)		T	G5	S1
<i>Adlumia fungosa</i>	Climbing Fumitory		SC-V	G4	S2
<i>Aeschynomene virginica</i>	Sensitive Joint-vetch	T	T	G2	S1
<i>Agalinis virgata</i>	Branched Gerardia		T	G3G4Q	S2
<i>Agrostis mertensii</i>	Arctic Bentgrass		E	G5	S1
<i>Aletris lutea</i>	Yellow Colicroot		T	G4G5	S1
<i>Allium allegheniense</i>	Allegheny Onion		SC-V	G3?	S1
<i>Allium keeverae</i>	Keever's Onion		SC-V	G2	S2
<i>Alnus crispa</i>	Green Alder, Mountain Alder		SC-V	G5	S1
<i>Amaranthus pumilus</i>	Seabeach Amaranth	T	T	G2	S1
<i>Amorpha confusa</i>	Savanna Indigo-bush		T	G3	S3
<i>Amorpha georgiana</i>	Georgia Indigobush		E	G3	S2
<i>Amphicarpum muehlenbergianum</i>	Blue Maiden-cane, Florida Goober Grass		E	G4	S1
<i>Anemone berlandieri</i>	Southern Anemone, Eastern Prairie Anemone		E	G4?	S2
<i>Anemone caroliniana</i>	Prairie Anemone, Carolina Anemone		E	G5	S1
<i>Arabis adpressipilis</i>	Hairy Rockcress, Slender Rockcress		E	G4Q	S1
<i>Arethusa bulbosa</i>	Bog-rose, Dragon's-mouth		E	G5	S1
<i>Aristida condensata</i>	Big Three-awn Grass		T	G4?	S2
<i>Aristida simpliciflora</i>	Southern Three-awn Grass		E	G3G4	S1S2
<i>Arnoglossum ovatum var. lanceolatum</i>	Savanna Indian-plantain		E	G4G5	S2
<i>Asclepias cinerea</i>	Carolina Milkweed		SC-H	G4?	SH
<i>Asclepias pedicellata</i>	Savannah Milkweed		SC-V	G4	S3
<i>Asplenium heteroresiliens</i>	Carolina Spleenwort		E	G2	S2
<i>Asplenium monanthes</i>	Single-sorus Spleenwort		E	G4	S1
<i>Asplenium ruta-muraria var. cryptolepis</i>	American Wall-rue		SC-V	G5	S1
<i>Astragalus michauxii</i>	Sandhills Milkvetch		SC-V	G3	S3
<i>Baccharis glomeruliflora</i>	Silverling		E	G4	S1
<i>Bacopa caroliniana</i>	Blue Water-hyssop		T	G4G5	S1
<i>Bacopa innominata</i>	Tropical Water-hyssop		SC-H	G3G5	SH
<i>Balduina atropurpurea</i>	Purple-disk Honeycomb-head		E	G2	S1
<i>Baptisia aberrans</i>	Eastern Prairie Blue Wild Indigo		E	G2	S2
<i>Baptisia alba</i>	Thick-pod White Wild Indigo		T	G5	S2
<i>Baptisia bracteata</i>	Creamy Wild Indigo		SC-H	G4G5	SNR
<i>Berberis canadensis</i>	American Barberry		SC-V	G3G4	S2

**APPENDIX PA-2**

**Plant SGCN**

		Protection Status <sup>1</sup>		NatureServe Rank	
		Federal Status	State Status	Global Rank	State Rank
Scientific Name	Common Name				
<i>Betula cordifolia</i>	Mountain Paper Birch		SC-V	G5	S1
<i>Bouteloua curtipendula</i> var. <i>curtipendula</i>	Sideoats Grama		T	G5	SNR
<i>Bromus ciliatus</i>	Fringed Brome		SC-V	G5	S1
<i>Buchnera americana</i>	American Bluehearts		E	G5?	S1
<i>Buckleya distichophylla</i>	Piratebush		T	G3	S2
<i>Bulbostylis warei</i>	Ware's Hair Sedge		SC-H	G3G4	SH
<i>Calamagrostis cainii</i>	Cain's Reedgrass		E	G1	S1
<i>Calamagrostis canadensis</i> var. <i>canadensis</i>	Canada Reedgrass		SC-V	G5	S1
<i>Calopogon multiflorus</i>	Many-flowered Grass-pink		E	G2G3	S1
<i>Caltha palustris</i> var. <i>palustris</i>	Marsh Marigold		E	G5	S1
<i>Camassia scilloides</i>	Wild Hyacinth		T	G4G5	S1
<i>Campanula rotundifolia</i>	Bluebells		E	G5	S1
<i>Cardamine dissecta</i>	Dissected Toothwort		SC-V	G4?	S2
<i>Cardamine longii</i>	Long's Bittercress		SC-V	G3?	S2
<i>Cardamine micranthera</i>	Small-anthered Bittercress	E	E	G2	S1
<i>Carex arctata</i>	Black Sedge		T	G5	S1
<i>Carex argyrantha</i>	Hay Sedge		T	G5	S1
<i>Carex barrattii</i>	Barratt's Sedge		T	G4	SH
<i>Carex basiantha</i>	Widow Sedge		E	G5	S1
<i>Carex buxbaumii</i>	Brown Bog Sedge		SC-V	G5	S2
<i>Carex calcifugens</i>	Calcium-fleeing Sedge		SC-V	G3	S2?
<i>Carex careyana</i>	Carey's Sedge		T	G4G5	S1
<i>Carex cherokeensis</i>	Cherokee Sedge		T	G4G5	S1
<i>Carex conoidea</i>	Cone-shaped Sedge		T	G5	S1
<i>Carex cristatella</i>	Crested Sedge; Small-crested Sedge		SC-V	G5	S1
<i>Carex eburnea</i>	Bristle-leaf Sedge		T	G5	S1
<i>Carex exilis</i>	Coastal Sedge		E	G5	S2
<i>Carex hormathodes</i>	Marsh Straw Sedge		T	G4G5	S1
<i>Carex impressinervia</i>	Ravine Sedge		SC-V	G2	S2
<i>Carex jamesii</i>	James' Sedge		SC-V	G5	S2
<i>Carex lasiocarpa</i> var. <i>americana</i>	Slender Sedge		SC-V	G5T5	S1
<i>Carex lutea</i>	Golden Sedge	E	E	G2	S2
<i>Carex meadii</i>	Mead's Sedge		E	G4G5	S1
<i>Carex oligocarpa</i>	Rich-woods Sedge		T	G4G5	S1
<i>Carex oligosperma</i>	Few-seeded Sedge		E	G5	S1
<i>Carex pedunculata</i> var. <i>pedunculata</i>	Longstalk Sedge		SC-V	G5	S2
<i>Carex radfordii</i>	Radford's Sedge		T	G3	S1
<i>Carex reniformis</i>	Kidney Sedge		T	G4?	S1
<i>Carex superata</i>	Limestone Forest Sedge		T	G4?	S1?
<i>Carex tenax</i>	Wire Sedge		E	G5?	S1
<i>Carex trichocarpa</i>	Hairy-fruited Sedge		SC-V	G4	S1
<i>Carex trisperma</i>	Three-seeded Sedge		E	G5	S1
<i>Carex utriculata</i>	Beaked Sedge		E	G5	S1
<i>Carex vesicaria</i>	Inflated Sedge		E	G5	S1
<i>Carex vestita</i>	Velvet Sedge		T	G5	S1
<i>Carya laciniosa</i>	Big Shellbark Hickory		T	G5	S1
<i>Carya myristiciformis</i>	Nutmeg Hickory		E	G4	S1



**APPENDIX PA-2**

**Plant SGCN**

		Protection Status <sup>1</sup>		NatureServe Rank	
		Federal Status	State Status	Global Rank	State Rank
Scientific Name	Common Name				
<i>Caulophyllum giganteum</i>	Northern Blue Cohosh		SC-V	G4G5	S1
<i>Celastrus scandens</i>	American Bittersweet		E	G5	S2?
<i>Chamerion angustifolium ssp. circumvagum</i>	Fireweed		E	G5T5	S1
<i>Chasmanthium nitidum</i>	Shiny Spanglegrass		T	G3G4	S1
<i>Chelone cuthbertii</i>	Cuthbert's Turtlehead		SC-V	G3	S3
<i>Chenopodium simplex</i>	Mapleleaf Goosefoot		T	G5	S1
<i>Chrysoma pauciflosculosa</i>	Woody Goldenrod		E	G4G5	S1
<i>Cirsium carolinianum</i>	Carolina Thistle		E	G5	S2
<i>Cirsium lecontei</i>	Le Conte's Thistle		SC-V	G3	S2
<i>Clematis occidentalis var. occidentalis</i>	Mountain Clematis		SC-V	G5	S1
<i>Clinopodium georgianum</i>	Georgia Calamint		E	G5	S1
<i>Collinsonia verticillata</i>	Whorled Horsebalm		T	G3G4	S2
<i>Conioselinum chinense</i>	Hemlock-parsley		T	G5	S1
<i>Coptis trifolia</i>	Goldthread		T	G5	S1
<i>Coreopsis auriculata</i>	Short-awned Coreopsis		T	G5	S4
<i>Corydalis micrantha</i>	Slender Corydalis		T	G5	S1
<i>Coryphopteris simulata</i>	Bog Fern		E	G4G5	S1
<i>Crataegus pallens</i>	Pale Hawthorn		T	G1	S1
<i>Crinum americanum var. americanum</i>	Swamp-lily		SC-H	G5	SH
<i>Crocانthemum bicknellii</i>	Plains Sunrose		SC-V	G5	S1
<i>Crocانthemum carolinianum</i>	Carolina Sunrose		E	G4	S1
<i>Crocانthemum corymbosum</i>	Pinebarren Sunrose		T	G4G5	S1
<i>Crocانthemum georgianum</i>	Georgia Sunrose		E	G4	S1
<i>Crocانthemum nashii</i>	Florida Scrub Sunrose		E	G3?	S1
<i>Crocانthemum propinquum</i>	Creeping Sunrose		T	G4	S1
<i>Crocانthemum rosmarinifolium</i>	Rosemary Sunrose		T	G4	S2
<i>Croton monanthogynus</i>	Prairie-tea Croton		E	G5	S1
<i>Cyperus dentatus</i>	Toothed Flatsedge		SC-H	G4	SH
<i>Cyperus granitophilus</i>	Granite Flatsedge		T	G3G4Q	S2
<i>Cyperus lecontei</i>	Le Conte's Flatsedge		T	G4?	S2
<i>Cyperus subsquarrosus</i>	Small-flowered Halfchaff, Small-flowered Hemicarpha		SC-H	G5	SH
<i>Cyperus tetragonus</i>	Four-angled Flatsedge		SC-V	G4?	S2
<i>Cyperus virens</i>	Green Flatsedge		SC-V	G5	S1
<i>Cystopteris tennesseensis</i>	Tennessee Bladder-fern		E	G5	S1
<i>Dactylorhiza viridis</i>	Long-bracted Frog Orchid		T	G5	S1
<i>Dalibarda repens</i>	Robin Runaway		E	G5	S2
<i>Delphinium exaltatum</i>	Tall Larkspur		T	G3	S2
<i>Deschampsia cespitosa ssp. glauca</i>	Tufted Hairgrass		T	G5	S1
<i>Desmodium ochroleucum</i>	Creamy Tick-trefoil		SC-H	G2G3	SH
<i>Desmodium sessilifolium</i>	Sessile Tick-trefoil		SC-H	G5	SH
<i>Diarrhena americana</i>	Eastern Beakgrass; Eastern Beakgrass		T	G4G5	S1
<i>Dichantherium annulum</i>	Ringed Witchgrass		E	G4	S1
<i>Dichantherium caerulescens</i>	Blue Witchgrass		T	G2G3	S2
<i>Dichantherium hirstii</i>	Hirst Brothers' Witchgrass		E	G1	S1
<i>Dichantherium spretum</i>	Eaton's Witchgrass		E	G5	S1S2
<i>Dichantherium strigosum var. glabrescens</i>	Hairless Witchgrass		T	G5T4T5	S1
<i>Diervilla rivularis</i>	Riverbank Bush-honeysuckle		T	G3	S1

**APPENDIX PA-2**

**Plant SGCN**

		Protection Status <sup>1</sup>		NatureServe Rank	
		Federal Status	State Status	Global Rank	State Rank
Scientific Name	Common Name				
<i>Dionaea muscipula</i>	Venus Flytrap		T	G2	S2
<i>Diplachne maritima</i>	Salt-meadow Grass		E	G4Q	S1
<i>Drosera filiformis</i> var. <i>filiformis</i>	Threadleaf Sundew		SC-V	G4	S2
<i>Echinacea laevigata</i>	Smooth Coneflower	E	E	G2G3	S1S2
<i>Eleocharis cellulosa</i>	Gulfcoast Spikerush		T	G4G5	S2
<i>Eleocharis elongata</i>	Florida Spikerush		E	G5?	S1
<i>Eleocharis parvula</i>	Dwarf Spikerush		T	G5	S1
<i>Eleocharis robbinsii</i>	Robbins' Spikerush		SC-V	G4G5	S2S3
<i>Eleocharis vivipara</i>	Viviparous Spikerush		T	G5	S1
<i>Elymus trachycaulus</i> ssp. <i>trachycaulus</i>	Slender Wheatgrass		T	G5	S1
<i>Enemion biternatum</i>	Eastern Isopyrum; False Rue-anemone		SC-V	G5	S2
<i>Epidendrum conopseum</i>	Green-fly Orchid		T	G4	S1S2
<i>Erigeron bulbosa</i>	Harbinger-of-spring		T	G5	S1
<i>Eriocaulon aquaticum</i>	Seven-angled Pipewort		SC-V	G5	S2
<i>Eriocaulon parkeri</i>	Estuary Pipewort		T	G3	S1
<i>Eriocaulon texense</i>	Texas Hatpins		E	G4	S1
<i>Eriogonum tomentosum</i>	Southern Wild-buckwheat		SC-H	G4G5	SH
<i>Erythrina herbacea</i>	Coralbean		E	G5	S2
<i>Eupatorium leptophyllum</i>	Limesink Dog-fennel		E	G4G5	S2
<i>Eupatorium paludicola</i>	Bay Boneset		E	G2	S1S2
<i>Euphorbia commutata</i>	Cliff Spurge		T	G5	S1
<i>Euphorbia cordifolia</i>	Heartleaf Sandmat		T	G5	S1
<i>Euphorbia mercurialina</i>	Cumberland Spurge		SC-V	G4	S2
<i>Filipendula rubra</i>	Queen-of-the-Prairie		E	G4G5	S1
<i>Fimbristylis perpusilla</i>	Harper's Fimbry		T	G2	S1
<i>Gaillardia aestivalis</i> var. <i>aestivalis</i>	Sandhills Blanket-flower		E	G5	S2
<i>Galactia mollis</i>	Soft Milk-pea		T	G4G5	S2
<i>Gaylussacia brachycera</i>	Box Huckleberry		E	G3	S1
<i>Gaylussacia nana</i>	Confederate Huckleberry; Dwarf Dangleberry		E	G4	S1
<i>Gaylussacia orocola</i>	Appalachian Dwarf Huckleberry		E	G1	S1
<i>Gelsemium rankinii</i>	Swamp Jessamine		SC-V	G5	S1S2
<i>Gentiana alba</i>	Pale Gentian; Yellow Gentian		SC-H	G4	SH
<i>Gentiana latidens</i>	Balsam Mountain Gentian		T	G1G2	S1S2
<i>Gentianopsis crinita</i>	Fringed Gentian		E	G5	S1
<i>Geum aleppicum</i>	Yellow Avens		E	G5	S1
<i>Geum geniculatum</i>	Bent Avens		SC-V	G2	S1S2
<i>Geum laciniatum</i>	Rough Avens		E	G5	S1
<i>Geum radiatum</i>	Spreading Avens	E	E	G2	S2
<i>Gillenia stipulata</i>	Indian Physic		T	G5	S2
<i>Glyceria laxa</i>	Lax Mannagrass		SC-V	G5	S2
<i>Gratiola lutea</i>	Golden Hedge-hyssop		SC-V	G5	S1
<i>Gymnocarpium appalachianum</i>	Appalachian Oak Fern		T	G3	S1
<i>Harperella nodosa</i> ( <i>Ptilimnium nodosum</i> )	Harperella	E	E	G2	S1
<i>Helianthus tenellum</i>	Dwarf Burhead		E	G5?	S1
<i>Helenium brevifolium</i>	Littleleaf Sneezeweed		E	G4	S1
<i>Helenium vernale</i>	Spring Sneezeweed		E	G4?	S1
<i>Helianthus floridanus</i>	Florida Sunflower		T	G3G4	S1

**APPENDIX PA-2**

**Plant SGCN**

		Protection Status <sup>1</sup>		NatureServe Rank	
		Federal Status	State Status	Global Rank	State Rank
Scientific Name	Common Name				
<i>Helianthus laevigatus</i>	Smooth Sunflower		SC-V	G4	S3
<i>Helianthus occidentalis ssp. occidentalis</i>	Naked-stem Sunflower		SC-H	G5T5	SX
<i>Helianthus schweinitzii</i>	Schweinitz's Sunflower	E	E	G3	S3
<i>Helonias bullata</i>	Swamp-pink	T	T	G3	S2
<i>Hexastylis contracta</i>	Southern Heartleaf		E	G3	S1
<i>Hexastylis naniflora</i>	Dwarf-flower Heartleaf	T	T	G3	S3
<i>Hibiscus aculeatus</i>	Comfortroot		T	G4G5	S1
<i>Hottonia inflata</i>	Featherfoil		SC-V	G4	S1?
<i>Houstonia montana</i>	Roan Mountain Bluet	E	E	G1	S1
<i>Hudsonia montana</i>	Mountain Golden-heather	T	T	G1	S1
<i>Hudsonia tomentosa</i>	Sand-heather		T	G5	S2
<i>Hydrastis canadensis</i>	Goldenseal		SC-V	G3G4	S3
<i>Hymenocallis occidentalis var. occidentalis</i>	Hillside Spiderlily, Woodland Spiderlily		SC-H	G?TNR	SH
<i>Hymenocallis pygmaea</i>	Waccamaw River Spiderlily		SC-V	G2Q	S1
<i>Hypericum adpressum</i>	Bog St. John's-wort		SC-H	G3	SH
<i>Hypericum brachyphyllum</i>	Coastal Plain St. John's-wort		SC-V	G5	S1S2
<i>Hypericum fasciculatum</i>	Peelbark St. John's-wort		E	G5	S1
<i>Hypericum radfordiorum</i>	Radford's St. John's-wort		SC-V	G2	S2
<i>Hypericum suffruticosum</i>	Pineland St. John's-wort		SC-H	G4G5	SH
<i>Ilex collina</i>	Long-stalked Holly		SC-V	G3	S1
<i>Ipomoea imperati</i>	Beach Morning-glory		SC-V	G5	S1
<i>Ipomoea macrorhiza</i>	Manroot		SC-H	G3G5	SH
<i>Isoetes microvela</i>	Thin-wall Quillwort		T	G1	S1
<i>Isoetes piedmontana</i>	Piedmont Quillwort		T	G4	S2
<i>Isotria medeoloides</i>	Small Whorled Pogonia	T	T	G2G3	S1
<i>Iva microcephala</i>	Small-headed Marsh Elder		T	G5	S2
<i>Jeffersonia diphylla</i>	Twinleaf		T	G5	S1
<i>Juncus articulatus</i>	Jointleafed Rush		SC-H	G5	SH
<i>Juncus caesariensis</i>	New Jersey Rush		E	G2G3	S1
<i>Juniperus communis var. depressa</i>	Dwarf Juniper		T	G5T5	S1
<i>Kalmia angustifolia</i>	Sheep-laurel		T	G5	S1
<i>Koeleria spicata (Koeleria spicata ssp. spicata)</i>	Soft Trisetum, Spike Trisetum		SC-H	G3G4	S2
<i>Lachnocaulon minus</i>	Brown Bogbutton		T	G5T3Q	S1
<i>Lechea maritima var. virginica</i>	Maritime Pinweed		T	G5T3Q	S1
<i>Lechea torreyi var. congesta</i>	Torrey's Pinweed		E	G4TMR	S1
<i>Liatis aspera</i>	Rough Blazing-star		SC-V	G4G5	S1
<i>Liatis helleri</i>	Heller's Blazing-star	T	T	G2Q	S2
<i>Liatis microcephala</i>	Small-head Blazing-star		SC-V	G3G4	S1
<i>Lilium canadense</i>	Canada Lily		E	G5	S1
<i>Lilium grayi</i>	Gray's Lily		T	G1G2	S1S2
<i>Lilium philadelphicum var. philadelphicum</i>	Wood Lily		E	G5	S1
<i>Lilium pyrophilum</i>	Sandhills Lily		E	G2	S2
<i>Limosella australis</i>	Awl-leaf Mudwort		T	G5	S1
<i>Lindera melissifolia</i>	Pondberry	E	E	G3	S1
<i>Lindera subcoriacea</i>	Bog Spicebush		SC-V	G3	S2
<i>Linum floridanum var. chrysocarpum</i>	Yellow-fruited Flax		T	G5?T3?	S1S2
<i>Linum sulcatum</i>	Glade Flax		SC-H	G5	SH

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## Plant SGCN

		Protection Status <sup>1</sup>		NatureServe Rank	
		Federal Status	State Status	Global Rank	State Rank
Scientific Name	Common Name				
<i>Liparis loeselii</i>	Fen Orchid		E	G5	S1
<i>Lithospermum canescens</i>	Hoary Puccoon		T	G5	S2
<i>Litsea aestivalis</i>	Pondspice		SC-V	G3?	S2S3
<i>Lobelia boykinii</i>	Boykin's Lobelia		E	G2G3	S1S2
<i>Lophiola aurea</i>	Golden-crest		E	G4	S2
<i>Ludwigia lanceolata</i>	Lanceleaf Seedbox		E	G3	S1
<i>Ludwigia linifolia</i>	Flaxleaf Seedbox		T	G4	S2
<i>Ludwigia ravenii</i>	Raven's Seedbox		E	G1G2	S1 (S2?)
<i>Ludwigia sphaerocarpa</i>	Globe-fruit Seedbox		E	G5	S1
<i>Ludwigia suffruticosa</i>	Shrubby Seedbox		T	G5	S2
<i>Lupinus villosus</i>	Lady Lupine, Pink Sandhill Lupine		E	G5	S1
<i>Lycopodiella inundata</i>	Bog Clubmoss		E	G5	S1
<i>Lysimachia asperulifolia</i>	Rough-leaf Loosestrife	E	E	G3	S3
<i>Trientalis borealis</i>	Northern Starflower		T	G5	S1
<i>Lysimachia fraseri</i>	Fraser's Loosestrife		E	G3	S3
<i>Macbridea caroliniana</i>	Carolina Birds-in-a-nest, Carolina Bogmint		E	G2G3	S2
<i>Magnolia macrophylla</i>	Bigleaf Magnolia		SC-V	G5	S2
<i>Malaxis spicata</i>	Florida Adder's-mouth		SC-V	G4?	S1
<i>Marshallia grandiflora</i>	Large-flowered Barbara's-buttons		SC-H	GX	SX
<i>Marshallia legrandii</i>	Oak Barrens Barbara's-buttons		E	G1	S1
<i>Marshallia trinervia</i>	Broadleaf Barbara's-buttons		SC-H	G3	SH
<i>Melanthium woodii</i>	Ozark Bunchflower		T	G5	S1
<i>Melica nitens</i>	Three-flowered Melic		E	G5	S1
<i>Menyanthes trifoliata</i>	Buckbean		T	G5	S1
<i>Micranthes pensylvanica</i>	Swamp Saxifrage		E	G5	S1
<i>Mnesithea cylindrica</i>	Carolina Jointgrass		SC-H	G4G5	SH
<i>Mononeuria groenlandica</i>	Greenland Sandwort		T	G5	S2
<i>Mononeuria paludicola</i>	Godfrey's Sandwort		E	G1	S1
<i>Mononeuria uniflora</i>	Single-flowered Sandwort		E	G4	S1
<i>Moranopteris nimbata</i>	West Indian Dwarf Polypody		T	G4?	S1
<i>Muhlenbergia glomerata</i>	Spiked Muhly		SC-V	G5	S1
<i>Muhlenbergia sobolifera</i>	Rock Muhly		T	G5	S2
<i>Muhlenbergia torreyana</i>	Pinebarren Smokegrass		SC-V	G3	S2
<i>Myrica gale</i>	Sweet Gale		E	G5	S1
<i>Myriophyllum laxum</i>	Loose Water-milfoil		E	G3	S2
<i>Myriophyllum tenellum</i>	Leafless Water-milfoil		E	G5	S1
<i>Nabalus albus</i>	Northern Rattlesnake-root, White Rattlesnakeroot		SC-V	G5	S2?
<i>Narthecium montanum</i>	Appalachian Yellow Asphodel		SC-H	GX	SX
<i>Oenothera perennis</i>	Perennial Sundrops		SC-V	G5	S2
<i>Oldenlandia boscii</i>	Bosc's Bluet		T	G5	S2
<i>Oligoneuron album</i>	Prairie Goldenrod, White Prairie-goldenrod		E	G5	S1
<i>Oligoneuron jacksonii</i>	Southeastern Bold Goldenrod		SC-V	G4	S2
<i>Oligoneuron rigidum</i>	Midwestern Bold Goldenrod, Prairie Bold Goldenrod		T	G5T5 [G5]	S1 [SNR]
<i>Orbexilum macrophyllum</i>	Bigleaf Scurfpea		SC-H	GX	SX
<i>Orbexilum onobrychis</i>	Lanceleaf Scurfpea		SC-H	G5	SH
<i>Orbexilum pedunculatum</i>	Western Sampson's Snakeroot		E	G5	SNR
<i>Oreojuncus trifidus</i>	Highland Rush		T	G5	S1

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**Plant SGCN**

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Scientific Name	Common Name				
<i>Orthochilus ecristatus</i>	Spiked Medusa		E	G2G3	S1
<i>Pachysandra procumbens</i>	Allegheny Spurge		E	G4G5	S1
<i>Packera crawfordii</i>	Bog Ragwort, Crawford's Ragwort		E	G2	S1
<i>Packera millefolium</i>	Blue Ridge Ragwort		SC-V	G3	S2
<i>Packera paupercula</i> var. <i>appalachiana</i>	Appalachian Ragwort		T	G5	S1?
<i>Packera paupercula</i> var. <i>paupercula</i>	Balsam Ragwort		SC-V	G5T5	S1?
<i>Packera schweinitziana</i>	New England Ragwort		T	G5?	S2
<i>Packera serpenticola</i>	Buck Creek Ragwort		T	G1	S1
<i>Palustricodon aparinoides</i> var. <i>aparinoides</i>	Marsh Bellflower		T	G5TNR	S2
<i>Panicum flexile</i>	Wiry Panic Grass		T	G5	S1
<i>Parnassia caroliniana</i>	Carolina Grass-of-Parnassus		T	G3	S2
<i>Parnassia grandifolia</i>	Bigleaf Grass-of-Parnassus		T	G3	S2
<i>Paronychia herniarioides</i>	Michaux's Whitlow-wort		E	G2G4	S1
<i>Paspalum dissectum</i>	Mudbank Crown Grass		E	G4?	S2
<i>Pedicularis lanceolata</i>	Swamp Lousewort		T	G5	S1
<i>Pellaea wrightiana</i>	Wright's Cliffbrake		E	G5	S1
<i>Persicaria hirsuta</i>	Hairy Smartweed		E	G3G4	S1
<i>Phacelia maculata</i>	Flatrock Phacelia		E	G3G4	S1
<i>Phegopteris connectilis</i>	Northern Beech Fern		E	G5	S2
<i>Phemeranthus piedmontanus</i>	Piedmont Rock-pink		E	G1	S1
<i>Pinguicula lutea</i>	Yellow Butterwort		SC-V	G4G5	S1
<i>Pinguicula pumila</i>	Small Butterwort		T	G4	S2
<i>Pityopsis graminifolia</i>	A Silkgrass		E	G5	S1?
<i>Plantago cordata</i>	Heart-leaf Plantain		E	G4	S1
<i>Plantago sparsiflora</i>	Pineland Plantain		T	G3	S1S2
<i>Platanthera herbiola</i>	Northern Rein Orchid, Tubercled Rein Orchid		SC-V	G4Q	S1S2
<i>Platanthera integra</i>	Yellow Fringeless Orchid		T	G3G4	S2
<i>Platanthera integrilabia</i>	White Fringeless Orchid	T	T	G2G3	SH
<i>Platanthera nivea</i>	Snowy Orchid		E	G5	SH
<i>Platanthera peramoena</i>	Purple Fringeless Orchid		T	G5	S2
<i>Platanthera shriveri</i>	Shriver's Purple Fringed Orchid		E	G1	S1
<i>Poa saltuensis</i>	Old-pasture Bluegrass		T	G5	S1
<i>Polemonium reptans</i> var. <i>reptans</i>	Spreading Jacob's Ladder		T	G5T5	S1
<i>Polygala hookeri</i>	Hooker's Milkwort		SC-V	G3	S2S3
<i>Polygala senega</i>	Seneca Snakeroot		SC-V	G4G5	S2
<i>Polygonella articulata</i>	Coast Jointweed, Northern Wireweed		SC-H	G5	SH
<i>Polygonum glaucum</i>	Seabeach Knotweed		E	G3	S1
<i>Ponthieva racemosa</i>	Shadow-witch		T	G4G5	S2
<i>Portulaca smallii</i>	Small's Portulaca		T	G3	S2
<i>Potamogeton illinoensis</i>	Illinois Pondweed		E	G5	S1
<i>Primula meadia</i>	Eastern Shooting-star		SC-V	G4G5	S2S3 [SNR]
<i>Pseudognaphalium helleri</i>	Heller's Rabbit-tobacco		E	G3G4	S2S3
<i>Ptilimnium costatum</i>	Big Bishopweed		T	G4	SNR
<i>Pyrola elliptica</i>	Elliptic Shinleaf		T	G5	S1
<i>Pyxidantha brevifolia</i>	Sandhills Pyxie-moss		T	G3	S2
<i>Quercus elliotii</i>	Running Oak		E	G3G5	S2
<i>Quercus ilicifolia</i>	Bear Oak		E	G5	S2

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**Plant SGCN**

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<i>Quercus minima</i>	Dwarf Live Oak		E	G5	S1
<i>Quercus prinoides</i>	Dwarf Chinquapin Oak		E	G5	S1
<i>Ranunculus ambigens</i>	Water-plantain Spearwort		SC-H	G4	SH
<i>Ranunculus hederaceus</i>	Ivy Buttercup, Ivy-leaved Water Crowfoot		T	G5	S1
<i>Rhexia aristosa</i>	Awned Meadow-beauty		SC-V	G3G4	S3
<i>Rhodiola rosea</i>	Roseroot		E	G5	SH
<i>Rhododendron prinophyllum</i>	Election Pink		T	G5	S1
<i>Rhus michauxii</i>	Michaux's Sumac	E	E	G2G3	S2
<i>Rhynchospora crinipes</i>	Alabama Beaksedge		T	G3	S1
<i>Rhynchospora decurrens</i>	Swamp Forest Beaksedge		T	G3G4	S1S2
<i>Rhynchospora harperi</i>	Harper's Beaksedge		SC-V	G4?	S2
<i>Rhynchospora macra</i>	Southern White Beaksedge		T	G3G4	S2
<i>Rhynchospora microcarpa</i>	Southern Beaksedge		T	G5	S2
<i>Rhynchospora odorata</i>	Fragrant Beaksedge		SC-V	G4	S1
<i>Rhynchospora pleiantha</i>	Coastal Beaksedge		T	G2G3	S2
<i>Rhynchospora thornei</i>	Thorne's Beaksedge		SC-V	G3	S2
<i>Rhynchospora tracyi</i>	Tracy's Beaksedge		T	G4	S2
<i>Rubus strigosus</i>	American Red Raspberry		T	G5	S2?
<i>Rudbeckia heliopsidis</i>	Sun-facing Coneflower		E	G2	S1
<i>Ruellia ciliosa</i>	Sandhills Wild-petunia		T	G3G5	S2
<i>Ruellia humilis</i>	Low Wild-petunia		T	G5	S1
<i>Ruellia purshiana</i>	Pursh's Wild-petunia		SC-V	G3	S2
<i>Ruellia strepens</i>	Limestone Wild Petunia		E	G4G5	S1
<i>Sabal palmetto</i>	Cabbage Palmetto		T	G5	S1
<i>Sabatia kennedyana</i>	Plymouth Gentian		T	G3G4	S2
<i>Sageretia minutiflora</i>	Small-flowered Buckthorn		T	G4	S1
<i>Sagittaria chapmanii</i>	Chapman's Arrowhead		T	G3?	S1
<i>Sagittaria fasciculata</i>	Bunched Arrowhead	E	E	G2	S1
<i>Sagittaria isoetiformis</i>	Quillwort Arrowhead		T	G4?	S2
<i>Sagittaria macrocarpa</i>	Streamhead Arrowhead, Streamhead Sagittaria		T	G2	S2
<i>Sagittaria weatherbiana</i>	Grassleaf Arrowhead		E	G3G4	S2
<i>Sarracenia jonesii</i>	Mountain Sweet Pitcherplant	E	E	G2	S1
<i>Sarracenia minor var. minor</i>	Hooded Pitcherplant		E	G4T4	S2
<i>Sarracenia oreophila</i>	Green Pitcherplant	E	E	G2	S1
<i>Sarracenia purpurea var. montana</i>	Southern Appalachian Purple Pitcher Plant		E	G5T1T2	S1S2
<i>Sceptridium jenmanii</i>	Alabama Grape-fern		SC-V	G3G4	S2
<i>Schisandra glabra</i>	Magnolia Vine		T	G3	S1
<i>Schwalbea americana</i>	Chaffseed	E	E	G2	S2
<i>Scirpus flaccidifolius</i>	Reclining Bulrush		E	G2	S1
<i>Scirpus lineatus</i>	Drooping Bulrush		T	G4	S2
<i>Scleria baldwinii</i>	Baldwin's Nutrush		T	G4	S2
<i>Scleria bellii</i>	Smooth-seeded Hairy Nutrush		E	G4	S2
<i>Scleria reticularis</i>	Netted Nutrush		SC-V	G4	S2
<i>Sclerolepis uniflora</i>	One-flower Hardscale, Sclerolepis		T	G4	S2
<i>Scutellaria australis</i>	Southern Skullcap		E	G5	SH
<i>Scutellaria galericulata</i>	Hooded Skullcap		SC-H	G5	SH
<i>Scutellaria leonardii</i>	Shale-barren Skullcap		E	G4	S2

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**Plant SGCN**

		Protection Status <sup>1</sup>		NatureServe Rank	
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Scientific Name	Common Name				
<i>Scutellaria nervosa</i>	Veined Skullcap		E	G5	S1
<i>Sedum pusillum</i>	Puck's Orpine		E	G3	S1
<i>Senecio suaveolens</i>	Sweet Indian-plantain		E	G4	S1
<i>Sesuvium maritimum</i>	Slender Sea-purslane		E	G5	S1
<i>Sesuvium portulacastrum</i>	Shoreline Sea-purslane		E	G5	S1
<i>Seymeria pectinata ssp. pectinata</i>	Comb Seymeria		SC-H	G4G5	SNR
<i>Shortia brevistyla</i>	Northern Oconee Bells		T	G2	S2
<i>Shortia galacifolia</i>	Southern Oconee Bells		SC-V	G3	S2
<i>Sideroxylon tenax</i>	Tough Bumelia		T	G3?	S1
<i>Silene ovata</i>	Mountain Catchfly		SC-V	G3	S3
<i>Silphium connatum</i>	Virginia Cup-plant		SC-V	G3G4	S2
<i>Silphium perfoliatum</i>	Common Cup-plant		SC-V	G5	S1
<i>Sisyrinchium dichotomum</i>	White Irisette	E	E	G2	S2
<i>Solidago leavenworthii</i>	Leavenworth's Goldenrod		E	G3G4	S1
<i>Solidago plumosa</i>	Yadkin River Goldenrod		T	G1	S1
<i>Solidago radula</i>	Western Rough Goldenrod		E	G5?	S1
<i>Solidago spithamaea</i>	Blue Ridge Goldenrod	T	T	G2	S2
<i>Solidago tortifolia</i>	Twisted-leaf Goldenrod		E	G4G5	S1
<i>Solidago verna</i>	Spring-flowering Goldenrod		T	G3	S3
<i>Solidago villosicarpa</i>	Carolina Maritime Goldenrod, Coastal Goldenrod		T	G1	S1
<i>Sparganium acaule</i>	Greenfruit Bur-reed		E	GNR	S1
<i>Spartina pectinata</i>	Freshwater Cordgrass		T	G5	S1
<i>Spigelia marilandica</i>	Pink-root		T	G4	S1
<i>Spiraea corymbosa</i>	Rock Spirea, Shinyleaf Meadowsweet		E	G4?	S1
<i>Spiraea virginiana</i>	Virginia Spiraea	T	T	G2	S2
<i>Spiranthes lacera var. lacera</i>	Northern Slender Ladies'-tresses		E	G5T5	S1
<i>Spiranthes laciniata</i>	Lace-lip Ladies'-tresses		SC-V	G4G5	S2
<i>Spiranthes longilabris</i>	Giant-spiral Orchid		E	G3	S1
<i>Spiranthes lucida</i>	Shining Ladies'-tresses		E	G4	S1
<i>Spiranthes ochroleuca</i>	Yellow Nodding Ladies'-tresses		T	G4	S1
<i>Sporobolus heterolepis</i>	Prairie Dropseed		T	G5	S1
<i>Sporobolus teretifolius</i>	Wireleaf Dropseed		E	G2	S1
<i>Sporobolus virginicus</i>	Saltmarsh Dropseed, Seashore Dropseed		T	G5	S1
<i>Stachys appalachiana</i>	Appalachian Hedge-nettle		E	G1G2	S1
<i>Stachys eplingii</i>	Epling's Hedge-nettle		E	G1G2	S1
<i>Stachys matthewsii</i>	Yadkin Hedge-nettle		E	G1G2	S1
<i>Stenanthium gramineum var. robustum</i>	Bog Featherbells		E	G4G5	S3?
<i>Stenanthium leimanthoides</i>	Pinebarrens Death-camas		T	G4Q	S1
<i>Stylisma aquatica</i>	Water Dawnflower		E	G4	S2
<i>Stylisma pickeringii var. pickeringii</i>	Pickering's Dawnflower		SC-V	G4T3	S3
<i>Swida asperifolia</i>	Eastern Roughleaf Dogwood		E	G4	S1
<i>Swida racemosa</i>	Gray Dogwood		SC-V	G5	S1
<i>Symphyotrichum concinnum</i>	Narrow-leaved Smooth Aster		E	G4	S2
<i>Symphyotrichum depauperatum</i>	Serpentine Aster		E	G2	S1
<i>Symphyotrichum georgianum</i>	Georgia Aster	C	T	G3	S3
<i>Symphyotrichum oblongifolium</i>	Eastern Aromatic Aster		T	G5	S1
<i>Symphyotrichum rhiannon</i>	Buck Creek Aster		T	G1	S1

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**Plant SGCN**

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Scientific Name	Common Name				
<i>Synandra hispidula</i>	Synandra		T	G4	S1
<i>Taxus canadensis</i>	Canada Yew		T	G5	S1
<i>Thalictrum cooleyi</i>	Cooley's Meadowrue	E	E	G1	S1
<i>Thalictrum macrostylum</i>	Small-leaved Meadowrue		SC-V	G3G4	S2
<i>Thaspium pinnatifidum</i>	Mountain Thaspium		E	G2G3	S1
<i>Thermopsis fraxinifolia</i>	Ash-leaved Golden-banner		SC-V	G3?	S2?
<i>Tiedemannia canbyi (Oxypolis canbyi)</i>	Canby's Dropwort	E	E	G2	S1
<i>Triantha glutinosa</i>	Sticky Bog Asphodel		SC-V	G5	S1
<i>Trichostema brachiatum</i>	Glade Bluecurls		E	G5	S1
<i>Trichostema nesophilum</i>	Dune Bluecurls		SC-V	G2	S2
<i>Tridens ambiguus</i>	Pineland Triodia		E	G4	S1
<i>Tridens chapmanii</i>	Chapman's Redtop, Chapman's Triodia		SC-V	G5T3	S1S2
<i>Tridens strictus</i>	Spike Triodia		SC-H	G5	SH
<i>Trifolium carolinianum</i>	Carolina Clover		SC-H	G5	SH
<i>Trifolium reflexum</i>	Buffalo Clover		T	G3G4	S1S2
<i>Trillium discolor</i>	Mottled Trillium, Pale Yellow Trillium		T	G3	S1
<i>Trillium flexipes</i>	Bent White Trillium		T	G5	S1
<i>Trillium pusillum var. ozarkanum</i>	Ozark Least Trillium		E	G4T3	SH (S1)
<i>Trillium pusillum var. pusillum</i>	Carolina Least Trillium		E	T3	S2
<i>Trillium pusillum var. virginianum</i>	Virginia Least Trillium		E	G4T3	S1
<i>Trillium recurvatum</i>	Prairie Trillium, Recurved Trillium		T	G5	S1
<i>Trillium sessile</i>	Sessile-flowered Trillium		T	G5	S1
<i>Trillium simile</i>	Sweet White Trillium		SC-V	G3	S2
<i>Turritis glabra</i>	Tower Mustard		E	G5	S1
<i>Urtica chamaedryoides</i>	Dwarf Stinging Nettle		T	G4G5	S2
<i>Utricularia cornuta</i>	Horned Bladderwort		T	G5	S1S2
<i>Utricularia geminiscapa</i>	Two-flowered Bladderwort		SC-V	G4G5	S1
<i>Utricularia minor</i>	Small Bladderwort		SC-H	G5	SH
<i>Utricularia olivacea</i>	Dwarf Bladderwort		T	G4	S2
<i>Utricularia resupinata</i>	Northeastern Bladderwort		E	G4	S1
<i>Vaccinium macrocarpon</i>	Cranberry		T	G5	S2
<i>Vandenboschia boschiana</i>	Appalachian Filmy-fern, Appalachian Bristle Fern		E	G4	S1
<i>Veronica americana</i>	American Speedwell		T	G5	S2
<i>Waldsteinia lobata</i>	Lobed Barren-strawberry		E	G3	SH
<i>Warea cuneifolia</i>	Carolina Pineland-cress		E	G4	S1
<i>Woodsia ilvensis</i>	Rusty Cliff Fern		E	G5	S1
<i>Xyris floridana</i>	Florida Yellow-eyed-grass		SC-V	G4G5	S1
<i>Xyris scabrifolia</i>	Harper's Yellow-eyed-grass, Roughleaf Yellow-eyed-grass		SC-V	G3	S2
<i>Xyris serotina</i>	Acid-swamp Yellow-eyed-grass		SC-H	G3G4	SH
<i>Xyris stricta</i>	Pineland Yellow-eyed-grass		E	G4	SNR
<i>Zephyranthes simpsonii</i>	Rain Lily, Florida Atamasco-lily		E	G2G3	S1



**APPENDIX PA-2**

**Plant SGCN**

Scientific Name	Common Name	Protection Status <sup>1</sup>		NatureServe Rank	
		Federal Status	State Status	Global Rank	State Rank

**<sup>1</sup> Federal and State Status Abbreviations**

Federal Listings

E = Endangered    T = Threatened    T (S/A) = Threatened due to Similar Appearance    C = Candidate  
 PE = Proposed Endangered    PT = Proposed Threatened

In North Carolina, Endangered, Threatened, and Special Concern species have legally protected status through the North Carolina Plant Conservation Program (NCPCP).

State Listings

E = Endangered    T = Threatened    SC = Special Concern

A copy of this table can be downloaded in MicroSoft Excel format from the NC Wildlife Action Plan web site: [www.ncwildlife.org/plan](http://www.ncwildlife.org/plan)

**<sup>2</sup> NatureServe Global and State Ranks**

Conservation ranks are either state (S) or global (G) and are based on a one-to-five scale, ranging from critically imperiled (S1 or G1) to demonstrably secure (S5 or G5). Global (G) ranks apply to the species throughout its range while state (S) ranks apply to the species within North Carolina. A rank involving two numbers indicates uncertainty based on existing data.

- S1/G1 Critically imperiled: Typically 5 or fewer occurrences or very few remaining individuals (<1,000).
- S2/G2 Imperiled: Typically 6 to 20 occurrences or few remaining individuals (1,000 to 3,000).
- S3/G3 Vulnerable: Typically 21 to 100 occurrences or between 3,000 to 10,000 individuals.
- S4/G4 Apparently Secure: Usually with more than 100 occurrences and more than 10,000 individuals.
- S5/G5 Secure: Typically with considerably more than 100 occurrences and more than 10,000 individuals.

Additional designations are used to further indicate status globally (G) or within the state (S).

- H - Historical: Possibly extirpated; known from historical records but may not have been verified in the past 20 to 40 years.
- NR - Not Ranked: Rank not yet assessed in the state.
- NA - Not Applicable: Applies to hybrid, exotic origin, accidental/irregular occurrence; synonym or taxon not recognized, or never found in state.
- Q - Questionable Taxonomy: Distinctiveness of this species as a taxon at the current level is questionable.
- X - Presumed Extirpated: Believed to be extirpated; has not been located after intensive searches of historical sites or other appropriate habitats.
- U - Unrankable: More information is needed; unrankable due to lack of information or substantially conflicting information about status or trends.
- ? - Uncertain: Inexact or uncertain numeric rank.

# ***ADDENDUM 2***

R

## **North Carolina Protected Plant Species and Plant SGCN Evaluation Methodology**

# North Carolina Protected Plant Species Evaluation Methodology

Lesley Starke, NC Plant Conservation Program  
Misty Buchanan, NC Natural Heritage Program

The North Carolina Plant Conservation Board (PCP Board) is tasked with listing endangered, threatened, and special concern species of plants under the authority of the North Carolina Plant Protection and Conservation Act of 1979. The PCP Board directs their appointed Scientific Committee to assess the rare native plants of North Carolina to determine which species warrant listing, and in what category. In 2007-2008, the North Carolina Plant Conservation Program (PCP) and North Carolina Natural Heritage Program (NHP) launched a comprehensive review of North Carolina's rare plants with the goal of identifying and assessing rarity, threats, and trends associated with all the vascular and non-vascular plant taxa tracked by the NHP. The results of this assessment were used by the PCP Scientific Committee during their 2008 review of the *North Carolina Protected Plant Species List* to determine which species warrant listing and to create a list that is scientifically defensible, consistent, and intuitive. Following the update to the evaluation methodology in 2008-2009, the Scientific Committee and PCP Board set an intention to update the *North Carolina Protected Plant Species List* every five years to account for new data records, changes in taxonomy, and increased knowledge of emerging trends and threats.

In 2008-2009, PCP staff held meetings with the Scientific Committee and botanists around the state to review criteria and assess rarity, threats, and trends for 900 plant taxa tracked by NHP. Botanists who contributed to these assessments were associated with NHP and PCP as well as US Fish and Wildlife Service, National Park Service, USDA Forest Service, NC Botanical Garden, NC Museum of Natural Sciences, University of North Carolina Herbarium (NCU), North Carolina State University Herbarium (NCSC), Appalachian State University Herbarium (BOON), and private botanists and consultants. A final proposed list was published in the state register for a 60-day public comment period to allow for additional public input. After addressing all comments, a significantly updated *North Carolina Protected Plant Species List* was published December 1, 2010.

Historically in North Carolina, protected plant lists have emphasized rarity as the primary factor determining extinction risk, while the current assessment methodology recognizes rarity as one of three factors (rarity, trends, and threats). The criteria for this assessment were modified from guidelines developed by NatureServe (Master et al. 2003) and the World Conservation Union (IUCN) (Standards and Petitions Working Group 2006). The data on rarity, threats, and trends are based on data from NHP as well as expertise from more than two dozen botanists and biologists who participated in the 2008-2009 review. NHP began collecting data in 1975 and has more than 12,911 records of rare plant occurrences (NC NHP 2021). In special cases, taxa specialists were contacted directly for their input into the evaluation process.

## Rarity

Measures of rarity take into account the number of occurrences in the state and the viability of each occurrence (population size, habitat condition, and landscape context). NHP data are used to determine occurrence viability according to Element Occurrence Ranking Specifications developed by the NatureServe network (NatureServe 2002). The number of occurrences was determined using the NatureServe Element Occurrence Data Standard (NatureServe 2002). For the assessment, taxa were categorized according to the number of populations ranked as having good to excellent estimated viability (A-ranked or excellent viability, B-ranked or good viability, or E-ranked or verified extant) as defined by NatureServe (2002).

## Trends

Each taxon was evaluated for short-term trends (including extent of occurrences, number of occurrences, and/or condition of occurrences). Short-term trends refer to fluctuations in the size and viability of an occurrence over the past 10-20 years. The number of populations known or believed to be recently extirpated was determined by NHP data and observations from experts who attended assessment meetings. Each taxon was assigned an alphabetical value based on its ranked trend assessment following the NatureServe Conservation Status Assessment Criteria (Master et al. 2003) (Table 1).

Table 1. Ranked trend categories

Rank	Change	Description
A	>70% decline	Severely declining (decline in population, range, area occupied, and/or number or condition of occurrences)
B	50-70% decline	Very rapidly declining
C	30-50% decline	Rapidly declining
D	10-30% decline	Declining
E	±10% fluctuation	Stable
F	>10% increase	Increasing
U	Unknown	Unknown

## Threats

NHP data and other observations collected from experts were used to rate up to three threats for each species according to the severity, scope, and immediacy of each threat. If more than three threats exist for a species, the three most severe were used in the threat assessment. This evaluation includes indirect and direct threats that are observed, inferred, or suspected to have an impact on the species. During each threat assessment, the severity, scope, and immediacy were also assigned a ranked value of high,

medium, or low as described below. This evaluation also allows for the possibility of species to have no or insignificant threats.

#### Threat Severity

- High: Loss of species population (all individuals) or destruction of species habitat in area affected, irreversible or requiring long-term recovery (>100 yr).
- Moderate: Major reduction of species population or long-term degradation or reduction of habitat in area affected, requiring 50–100 yr for recovery.
- Low: Low but nontrivial reduction of species population or reversible degradation or reduction of habitat in area affected, with recovery expected in 10–50 yr.
- Insignificant: Essentially no reduction of population or degradation of habitat due to threats, or populations or habitats able to recover quickly (within 10 yr) from minor temporary loss. Note that effects of locally sustainable levels of hunting, fishing, logging, collecting, or other harvest from wild populations are generally considered Insignificant as defined here.

#### Threat Scope

- High: >60% of total population, occurrences, or area affected.
- Moderate: 20–60% of total population, occurrences, or area affected.
- Low: 5–20% of total population, occurrences, or area affected.
- Insignificant: <5% of total population or area affected.

#### Threat Immediacy

- High: Threat is operational (happening now) or imminent (within a year).
- Moderate: Threat is likely to be operational within 2–5 yr.
- Low: Threat is likely to be operational within 5–20 yr.
- Insignificant: Threat not likely to be operational within 20 yr.

The values assigned for the severity, scope, and immediacy of each threat were incorporated into a matrix that generated a single, consolidated threat category value for that threat (Table 2). The highest-ranking threat value among the three threats per species was recorded as the overall threat value for that species. For example, the top three threats recorded for Venus Flytrap (*Dionaea muscipula*) are Development (Threat value=B), Fire Suppression (Threat value=F), and Poaching (Threat value=E); therefore, the overall threat value for this species is B. If these values could not be determined for a species, then the species was categorized as data deficient and was not further evaluated for potential listing. One exception to this procedure occurred for species that are limited to 1-2 populations in North Carolina. These species

are considered inherently susceptible to stochastic (unpredictable) threats and were therefore assigned to the highest threat category.

Once the rarity, trend, and threats were identified or assigned for a species, the trend and overall threat values were incorporated into a listing criteria matrix associated with the number of viable populations recorded for that species. There are three protected plant listing criteria matrices and each species is assigned to one of them based on the number of populations of good viability recorded in North Carolina for that species: (A) 1-5, (B) 6-19, or (C)  $\geq 20$  populations of good to excellent viability.

The possible outcomes from the listing criteria matrices are Endangered, Threatened, Special Concern-Vulnerable, or Significantly Rare. Only Endangered, Threatened, and Special Concern categories warrant listing on the *North Carolina Protected Plant Species List*. Species evaluated as Significantly Rare through this process are not added to the state list of protected species; however, they remain on the NHP *Rare Plant List* which does not have any regulatory authority. The Scientific Committee determined through this process that any tracked species with extant populations in North Carolina, but none of good to excellent viability (A-, B-, or E-ranked populations) would be listed as Endangered. Further, any tracked species with only extirpated (X-), historical (H-), and failed to find (F-) ranked populations in North Carolina would be listed as Special Concern-Historical.

Table 2. Threat matrix with threat parameters and ranked threat values.

Threat Severity	Threat Scope	Threat Immediacy	Value	Threat Description
High	High	High	A	Moderate to severe, imminent threat for most (>60%) of population, occurrences, or area
High	High	Moderate		
Moderate	High	High		
Moderate	High	Moderate		
High	Moderate	High	B	Moderate to severe, imminent threat for a significant portion (20-60%) of population, occurrences or area
High	Moderate	Moderate		
Moderate	Moderate	High		
Moderate	Moderate	Moderate		
High	High	Low	C	Moderate to severe, non-imminent threat for most of population, occurrences, or area
Moderate	High	Low		
High	Moderate	Low	D	Moderate to severe, non-imminent threat for a significant proportion of population, occurrences or area
Moderate	Moderate	Low		
High	Low	High	E	
High	Low	Moderate		

High	Low	Low		Moderate to severe threat for small proportion of population, occurrences, or area
Moderate	Low	High		
Moderate	Low	Moderate		
Moderate	Low	Low		
Low	High	High	F	Low severity threat for most or significant proportion of population, occurrences, or area
Low	High	Moderate		
Low	High	Low		
Low	Moderate	High		
Low	Moderate	Moderate		
Low	Moderate	Low		
Low	Low	High	G	Low severity threat for a small proportion of population, occurrences, or area
Low	Low	Moderate		
Low	Low	Low		

### Protected Plant Listing Criteria Matrices

E=Endangered, T=Threatened, SC-V=Special Concern-Vulnerable, SR=Significantly Rare

#### (A) 1-5 populations of good to excellent viability

		Short-term trend							
		A	B	C	D	E	F	U	Null
Threat	A	E	E	E	E	E	E	E	E
	B	E	E	E	E	E	T	T	T
	C	E	E	E	T	T	T	T	T
	D	E	E	T	T	T	T	SC-V	SC-V
	E	E	E	T	T	SC-V	SC-V	SC-V	SC-V
	F	E	T	T	SC-V	SC-V	SC-V	SC-V	SC-V
	G	E	T	T	SC-V	SC-V	SC-V	SC-V	SC-V

**(B) 6-19 populations of good to excellent viability**

		Short-term trend							
		A	B	C	D	E	F	U	Null
Threat	A	E	E	E	E	T	T	T	T
	B	E	E	T	T	T	SC-V	SC-V	SC-V
	C	E	T	T	SC-V	SC-V	SC-V	SC-V	SC-V
	D	E	T	SC-V	SC-V	SC-V	SC-V	SR	SR
	E	T	T	SC-V	SC-V	SR	SR	SR	SR
	F	T	SC-V	SC-V	SR	SR	SR	SR	SR
	G	T	SC-V	SC-V	SR	SR	SR	SR	SR

**(C) ≥20 populations of good to excellent viability**

		Short-term trend							
		A	B	C	D	E	F	U	Null
Threat	A	T	T	T	T	SC-V	SC-V	SC-V	SC-V
	B	T	T	SC-V	SC-V	SC-V	SR	SR	SR
	C	T	SC-V	SC-V	SR	SR	SR	SR	SR
	D	T	SC-V	SR	SR	SR	SR	SR	SR
	E	SC-V	SC-V	SR	SR	SR	SR	SR	SR
	F	SC-V	SR	SR	SR	SR	SR	SR	SR
	G	SC-V	SR	SR	SR	SR	SR	SR	SR

**Updating the List**

The first five-year update was delayed for unforeseen circumstances. In 2017-2019, the PCP staff worked with the Scientific Committee to propose systematic updates the *North Carolina Protected Plant Species List*. Keeping the evaluation methodology the same, the committee decided that rather than including all ~900 tracked plant taxa, only a subset would be evaluated during this and future list updates. First, all newly named or newly documented species (in North Carolina) that were not included in previous review processes would be evaluated. Second, Special Concern-Historical species that had been rediscovered in the state would be evaluated. Lastly, a set of thresholds was established that would identify those species for which NHP had received sufficient updates since the prior evaluation period to justify reevaluation.



These thresholds refer to changes in available data from the time of the previous update to the next update period:

- (1) Species with  $\leq 20$  viable occurrences and 2+ changes in the number of viable element occurrences,
- (2) species with  $> 20$  viable occurrences and a 20% change in the number of viable occurrences, and
- (3) species with  $\leq 6$  viable occurrences and 1+ change in the number of viable occurrences.

During the review of this subset of plant species, the trends and threats for each species were reassessed as well. The Scientific Committee may review the trends and threats of any tracked species with the NHP at any time between listing updates and determine with the PCP Board case by case if additional rule changes are warranted in between scheduled updates. The proposed updates resulting from the 2017-2019 reevaluation process were reviewed during a 60-day public comment period October 1-November 30, 2020. The updates were approved by the PCP Board in January 2021 and published in the NC Administrative Code on May 1, 2021.

In between listing updates, a special emphasis is placed on data deficient species and the intent to update the NHP database records for these species to facilitate listing evaluation. Fifty-seven of the 74 additions to the list between 2010 and 2021 were species that had been data deficient at the time of the 2008-2009 review, showcasing how important the influx of new data to NHP was to this process.

The most up to date list of protected plants, laws, and regulations can be found at the Plant Conservation Program website, [www.ncplant.com](http://www.ncplant.com). For details on how the assessment was performed or specific results, contact the PCP Program Manager (Lesley Starke).

### Next Steps

This evaluation process reveals where there are knowledge gaps regarding rare plant taxa in North Carolina, in particular with short-term trends that require repeat monitoring data and other site-specific knowledge. Although the 2017-2019 reevaluation included many previously data-deficient species, we note that nearly half of the tracked species that remain data deficient are non-vascular taxa and are generally less well studied relative to vascular plant taxa. Future evaluations of these taxa will require a dedicated effort to increase the knowledge and data recording within the NHP database and herbaria records. PCP intends to assemble a non-vascular species review task force to facilitate the literature review, data collation, and data evaluation process ahead of future list reevaluations.

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**APPENDIX A – PLANT CONSERVATION PROGRAM PROPOSED CHANGES TO LIST OF ENDANGERED,  
THREATENED, AND SPECIAL CONCERN SPECIES**

The following list summarizes proposed changes to the PCP list of protected species approved by the PCP Board in January 2021. Species which also occur on the federal list of endangered and threatened species under the Endangered Species Act are marked with two asterisks (\*\*). Comments about the proposed changes should be directed to PCP staff. For the most up to date list of protected plants, laws, regulations, and staff contact information, visit the Plant Conservation Program website, [www.ncplant.com](http://www.ncplant.com).

	<u>Species</u>	<u>Status</u>
(1)	<i>Acmispon helleri</i> Carolina Prairie-trefoil;	Threatened
(2)	<i>Acrobolbus ciliatus</i> A liverwort;	Special Concern, Vulnerable
(3)	<i>Adiantum capillus-veneris</i> Venus Hair Fern;	Threatened
(4)	<i>Adlumia fungosa</i> Climbing Fumitory;	Special Concern, Vulnerable
(5)	<i>Aeschynomene virginica</i> ** Sensitive Jointvetch;	Threatened
(6)	<i>Agalinis virgata</i> Branched Gerardia;	Threatened
(7)	<i>Agrostis mertensii</i> Arctic Bentgrass;	Endangered
(8)	<i>Aletris lutea</i> Yellow Colic-root;	Threatened
(9)	<i>Allium allegheniense</i> Allegheny Onion;	Special Concern, Vulnerable
(10)	<i>Allium keeverae</i> Keever's Onion;	Special Concern, Vulnerable
(11)	<i>Alnus crispa</i> Green Alder;	Special Concern, Vulnerable
(12)	<i>Amaranthus pumilus</i> ** Seabeach Amaranth;	Threatened
(13)	<i>Amorpha confusa</i> Savanna Indigo-bush;	Threatened
(14)	<i>Amorpha georgiana</i> Georgia Indigo-bush;	Endangered
(15)	<i>Amphicarpum muehlenbergianum</i> Florida Goober Grass, Blue Maidencane	Endangered
(16)	<i>Anemone berlandieri</i> Southern Anemone;	Endangered
(17)	<i>Anemone caroliniana</i> Prairie Anemone;	Endangered
(18)	<i>Arabis adpressipilis</i> Hairy Rockcress;	Endangered
(19)	<i>Arethusa bulbosa</i> Bog Rose;	Endangered
(20)	<i>Aristida condensata</i> Big Three-awn Grass;	Threatened
(21)	<i>Aristida simpliciflora</i> Chapman's Three-awn;	Endangered

(22)	<i>Arnoglossum ovatum</i> var. <i>lanceolatum</i> Savanna Indian-plantain;	Endangered
(23)	<i>Asclepias cinerea</i> Carolina Milkweed;	Special Concern, Historical
(24)	<i>Asclepias pedicellata</i> Savanna Milkweed;	Special Concern, Vulnerable
(25)	<i>Asplenium heteroresiliens</i> Carolina Spleenwort;	Endangered
(26)	<i>Asplenium monanthes</i> Single-sorus Spleenwort;	Endangered
(27)	<i>Asplenium ruta-muraria</i> var. <i>cryptolepis</i> Wall-rue;	Special Concern, Vulnerable
(28)	<i>Astragalus michauxii</i> Sandhills Milkvetch;	Special Concern, Vulnerable
(29)	<i>Baccharis glomeruliflora</i> Silverling;	Endangered
(30)	<i>Bacopa caroliniana</i> Blue Water-hyssop;	Threatened
(31)	<i>Bacopa innominata</i> Tropical Water-hyssop;	Special Concern, Historical
(32)	<i>Balduina atropurpurea</i> Purple-disk Honeycomb-head;	Endangered
(33)	<i>Baptisia aberrans</i> Eastern Prairie Blue Wild Indigo;	Endangered
(34)	<i>Baptisia alba</i> Thick-pod White Wild Indigo;	Threatened
(35)	<i>Baptisia bracteata</i> Creamy Wild Indigo;	Special Concern, Historical
(36)	<i>Berberis canadensis</i> American Barberry;	Special Concern, Vulnerable
(37)	<i>Betula cordifolia</i> Mountain Paper Birch;	Special Concern, Vulnerable
(38)	<i>Bouteloua curtipendula</i> var. <i>curtipendula</i> Sideoats Grama;	Threatened
(39)	<i>Bromus ciliatus</i> Fringed Brome;	Special Concern, Vulnerable
(40)	<i>Buchnera americana</i> American Bluehearts;	Endangered
(41)	<i>Buckleya distichophylla</i> Piratebush;	Threatened
(42)	<i>Bulbostylis warei</i> Ware's Hair Sedge;	Special Concern, Historical
(43)	<i>Calamagrostis cainii</i> Cain's Reedgrass;	Endangered
(44)	<i>Calamagrostis canadensis</i> var. <i>canadensis</i> Canada Reedgrass;	Special Concern, Vulnerable
(45)	<i>Calopogon multiflorus</i> Many-flowered Grass-pink;	Endangered
(46)	<i>Caltha palustris</i> var. <i>palustris</i> Marsh Marigold;	Endangered
(47)	<i>Camassia scilloides</i> Wild Hyacinth;	Threatened
(48)	<i>Campanula rotundifolia</i> Bluebells;	Endangered
(49)	<i>Campylium stellatum</i> Yellow Starry Fen Moss;	Special Concern, Vulnerable

(50)	<i>Cardamine dissecta</i> Dissected Toothwort;	Special Concern, Vulnerable
(51)	<i>Cardamine longii</i> Long's Bittercress;	Special Concern, Vulnerable
(52)	<i>Cardamine micranthera</i> ** Small-anthered Bittercress;	Endangered
(53)	<i>Carex arctata</i> Black Sedge;	Special Concern, Vulnerable
(54)	<i>Carex argyrantha</i> Hay Sedge;	Endangered
(55)	<i>Carex barrattii</i> Barratt's Sedge;	Special Concern, Historical
(56)	<i>Carex basiantha</i> Widow Sedge;	Endangered
(57)	<i>Carex buxbaumii</i> Brown Bog Sedge;	Special Concern, Vulnerable
(58)	<i>Carex calcifugens</i> Calcium-fleeing Sedge;	Special Concern, Vulnerable
(59)	<i>Carex careyana</i> Carey's Sedge;	Threatened
(60)	<i>Carex cherokeensis</i> Cherokee Sedge;	Threatened
(61)	<i>Carex conoidea</i> Cone-shaped Sedge, Field Sedge;	Threatened
(62)	<i>Carex cristatella</i> Crested Sedge;	Special Concern, Vulnerable
(63)	<i>Carex eburnea</i> Bristle-leaf Sedge;	Threatened
(64)	<i>Carex exilis</i> Coastal Sedge;	Endangered
(65)	<i>Carex hormathodes</i> Marsh Straw Sedge;	Threatened
(66)	<i>Carex impressinervia</i> Ravine Sedge;	Special Concern, Vulnerable
(67)	<i>Carex jamesii</i> James's Sedge;	Special Concern, Vulnerable
(68)	<i>Carex lasiocarpa</i> var. <i>americana</i> Slender Sedge;	Special Concern, Vulnerable
(69)	<i>Carex lutea</i> ** Golden Sedge;	Endangered
(70)	<i>Carex meadii</i> Mead's Sedge	Endangered
(71)	<i>Carex oligocarpa</i> Rich-woods Sedge;	Threatened
(72)	<i>Carex oligosperma</i> Few-seeded Sedge;	Endangered
(73)	<i>Carex pedunculata</i> var. <i>pedunculata</i> Longstalk Sedge;	Special Concern, Vulnerable
(74)	<i>Carex radfordii</i> Radford's Sedge;	Threatened
(75)	<i>Carex reniformis</i> Kidney Sedge;	Threatened
(76)	<i>Carex superata</i> Limestone Forest Sedge;	Threatened
(77)	<i>Carex tenax</i> Wire Sedge;	Endangered

(78)	<i>Carex trichocarpa</i> Hairy-fruited Sedge;	Special Concern, Vulnerable
(79)	<i>Carex trisperma</i> Three-seeded Sedge;	Endangered
(80)	<i>Carex utriculata</i> Beaked Sedge;	Endangered
(81)	<i>Carex vesicaria</i> Inflated Sedge;	Endangered
(82)	<i>Carex vestita</i> Velvet Sedge;	Threatened
(83)	<i>Carya laciniosa</i> Big Shellbark Hickory;	Threatened
(84)	<i>Carya myristiciformis</i> Nutmeg Hickory;	Endangered
(85)	<i>Caulophyllum giganteum</i> Northern Blue Cohosh;	Special Concern, Vulnerable
(86)	<i>Celastrus scandens</i> American Bittersweet;	Endangered
(87)	<i>Cetraria arenaria</i> Sand-loving Iceland Lichen;	Special Concern, Vulnerable
(88)	<i>Chamerion angustifolium</i> ssp. <i>circumvagum</i> Fireweed;	Endangered
(89)	<i>Chasmanthium nitidum</i> Shiny Spanglegrass;	Threatened
(90)	<i>Chelone cuthbertii</i> Cuthbert's Turtlehead;	Special Concern, Vulnerable
(91)	<i>Chenopodium simplex</i> Mapleleaf Goosefoot;	Threatened
(92)	<i>Chiloscyphus appalachianus</i> A liverwort;	Special Concern, Vulnerable
(93)	<i>Chiloscyphus muricatus</i> A liverwort;	Special Concern, Vulnerable
(94)	<i>Chrysoma pauciflosculosa</i> Woody Goldenrod;	Endangered
(95)	<i>Cirsium carolinianum</i> Carolina thistle;	Endangered
(96)	<i>Cirsium lecontei</i> LeConte's Thistle;	Special Concern, Vulnerable
(97)	<i>Clematis occidentalis</i> var. <i>occidentalis</i> Mountain Clematis;	Special Concern, Vulnerable
(98)	<i>Clinopodium georgianum</i> Georgia Calamint;	Endangered
(99)	<i>Collinsonia verticillata</i> Whorled Horsebalm;	Threatened
(100)	<i>Conioselinum chinense</i> Hemlock-parsley;	Threatened
(101)	<i>Coptis trifolia</i> Goldthread;	Threatened
(102)	<i>Coreopsis aristulata</i> Short-awned Coreopsis;	Threatened
(103)	<i>Corydalis micrantha</i> Slender Corydalis;	Threatened
(104)	<i>Coryphopteris simulata</i> Bog Fern;	Endangered
(105)	<i>Crataegus pallens</i> Pale Hawthorn;	Threatened

(106)	<i>Crinum americanum</i> var. <i>americanum</i> Swamp-lily;	Special Concern, Historical
(107)	<i>Crocianthemum bicknellii</i> Plains Sunrose;	Special Concern, Vulnerable
(108)	<i>Crocianthemum carolinianum</i> Carolina Sunrose;	Endangered
(109)	<i>Crocianthemum corymbosum</i> Pinebarren Sunrose;	Threatened
(110)	<i>Crocianthemum georgianum</i> Georgia Sunrose;	Endangered
(111)	<i>Crocianthemum nashii</i> Florida Scrub Sunrose, Florida Scrub Frostweed;	Endangered
(112)	<i>Crocianthemum propinquum</i> Creeping Sunrose;	Threatened
(113)	<i>Crocianthemum rosmarinifolium</i> Rosemary Sunrose;	Threatened
(114)	<i>Croton monanthogynus</i> Prairie-tea Croton;	Endangered
(115)	<i>Cyperus dentatus</i> Toothed Flatsedge;	Special Concern, Historical
(116)	<i>Cyperus granitophilus</i> Granite Flatsedge;	Threatened
(117)	<i>Cyperus lecontei</i> LeConte's Flatsedge;	Threatened
(118)	<i>Cyperus subsquarrosus</i> Small-flowered Halfchaff;	Special Concern, Historical
(119)	<i>Cyperus tetragonus</i> Four-angled Flatsedge;	Special Concern, Vulnerable
(120)	<i>Cyperus virens</i> Green Flatsedge;	Special Concern, Vulnerable
(121)	<i>Cystopteris tennesseensis</i> Tennessee Bladder-fern;	Endangered
(122)	<i>Dactylorhiza viridis</i> Long-bracted Frog Orchid;	Threatened
(123)	<i>Dalibarda repens</i> Robin-Run-Away;	Endangered
(124)	<i>Delphinium exaltatum</i> Tall Larkspur;	Threatened
(125)	<i>Deschampsia cespitosa</i> ssp. <i>glauca</i> Tufted Hairgrass;	Threatened
(126)	<i>Desmodium ochroleucum</i> Creamy Tick-trefoil;	Special Concern, Historical
(127)	<i>Desmodium sessilifolium</i> Sessile Tick-trefoil;	Special Concern, Historical
(128)	<i>Diarrhena americana</i> Eastern Beakgrass;	Threatened
(129)	<i>Dichanthelium annulum</i> Ringed Witchgrass;	Endangered
(130)	<i>Dichanthelium caeruleum</i> Blue Witchgrass;	Threatened
(131)	<i>Dichanthelium hirstii</i> Hirst Brothers' Witchgrass;	Endangered
(132)	<i>Dichanthelium spretum</i> Eaton's Witchgrass;	Endangered
(133)	<i>Dichanthelium strigosum</i> var. <i>glabrescens</i> Hairless Witchgrass;	Threatened

(134)	<i>Diervilla rivularis</i> Riverbank Bush-honeysuckle;	Threatened
(135)	<i>Dionaea muscipula</i> Venus Flytrap;	Threatened
(136)	<i>Diplachne maritima</i> Salt-meadow Grass;	Endangered
(137)	<i>Drosera filiformis</i> var. <i>filiformis</i> Threadleaf Sundew;	Special Concern, Vulnerable
(138)	<i>Echinacea laevigata</i> ** Smooth Coneflower;	Endangered
(139)	<i>Eleocharis cellulosa</i> Gulfcoast Spikerush;	Threatened
(140)	<i>Eleocharis elongata</i> Florida Spikerush;	Endangered
(141)	<i>Eleocharis parvula</i> Dwarf Spikerush;	Threatened
(142)	<i>Eleocharis robbinsii</i> Robbins' Spikerush;	Special Concern, Vulnerable
(143)	<i>Eleocharis vivipara</i> Viviparous Spikerush;	Threatened
(144)	<i>Elymus trachycaulus</i> ssp. <i>trachycaulus</i> Slender Wheatgrass;	Threatened
(145)	<i>Enemion biternatum</i> Isopyrum, False Rue-anemone;	Special Concern, Vulnerable
(146)	<i>Epidendrum conopseum</i> Green-fly Orchid;	Threatened
(147)	<i>Erigenia bulbosa</i> Harbinger-of-spring;	Threatened
(148)	<i>Eriocaulon aquaticum</i> Seven-angled Pipewort;	Special Concern, Vulnerable
(149)	<i>Eriocaulon parkeri</i> Estuary Pipewort;	Threatened
(150)	<i>Eriocaulon texense</i> Texas Hatpins;	Endangered
(151)	<i>Eriogonum tomentosum</i> Southern Wild-buckwheat;	Special Concern, Historical
(152)	<i>Erythrina herbacea</i> Coralbean;	Endangered
(153)	<i>Eupatorium leptophyllum</i> Limesink Dog-fennel;	Endangered
(154)	<i>Eupatorium paludicola</i> Bay Boneset;	Endangered
(155)	<i>Euphorbia commutata</i> Cliff Spurge;	Threatened
(156)	<i>Euphorbia cordifolia</i> Heartleaf Sandmat;	Threatened
(157)	<i>Euphorbia mercurialina</i> Cumberland Spurge;	Special Concern, Vulnerable
(158)	<i>Filipendula rubra</i> Queen-of-the-Prairie;	Endangered
(159)	<i>Fimbristylis perpusilla</i> Harper's Fimbry;	Threatened
(160)	<i>Gaillardia aestivalis</i> var. <i>aestivalis</i> Sandhills Blanket-flower;	Endangered
(161)	<i>Galactia mollis</i> Soft Milk-pea;	Threatened



(162)	<i>Gaylussacia brachycera</i> Box Huckleberry;	Endangered
(163)	<i>Gaylussacia nana</i> Confederate Huckleberry, Dwarf Dangleberry;	Endangered
(164)	<i>Gaylussacia orocola</i> Appalachian Dwarf Huckleberry;	Endangered
(165)	<i>Gelsemium rankinii</i> Swamp Jessamine;	Special Concern, Vulnerable
(166)	<i>Gentiana alba</i> Pale Gentian;	Special Concern, Historical
(167)	<i>Gentiana latidens</i> Balsam Mountain Gentian;	Threatened
(168)	<i>Gentianopsis crinita</i> Eastern Fringed Gentian;	Endangered
(169)	<i>Geum aleppicum</i> Yellow Avens;	Endangered
(170)	<i>Geum geniculatum</i> Bent Avens;	Special Concern, Vulnerable
(171)	<i>Geum laciniatum</i> Rough Avens;	Endangered
(172)	<i>Geum radiatum</i> ** Spreading Avens;	Endangered
(173)	<i>Gillenia stipulata</i> Indian Physic;	Threatened
(174)	<i>Glyceria laxa</i> Lax Mannagrass;	Special Concern, Vulnerable
(175)	<i>Gratiola lutea</i> Golden Hedge-hyssop;	Special Concern, Vulnerable
(176)	<i>Gymnocarpium appalachianum</i> Appalachian Oak Fern;	Threatened
(177)	<i>Gymnoderma lineare</i> ** Rock Gnome Lichen;	Endangered
(178)	<i>Harperella nodosa</i> [ <i>Ptilimnium nodosum</i> ]** Herperella;	Endangered
(179)	<i>Helanthium tenellum</i> Dwarf Burhead;	Endangered
(180)	<i>Helenium brevifolium</i> Littleleaf Sneezeweed;	Endangered
(181)	<i>Helenium vernale</i> Spring Sneezeweed;	Endangered
(182)	<i>Helianthus floridanus</i> Florida Sunflower;	Threatened
(183)	<i>Helianthus laevigatus</i> Smooth Sunflower;	Special Concern, Vulnerable
(184)	<i>Helianthus occidentalis</i> ssp. <i>occidentalis</i> Naked-stem Sunflower;	Special Concern, Historical
(185)	<i>Helianthus schweinitzii</i> ** Schweinitz's Sunflower;	Endangered
(186)	<i>Helonias bullata</i> ** Swamp Pink;	Threatened
(187)	<i>Hexastylis contracta</i> Mountain Heartleaf;	Endangered
(188)	<i>Hexastylis naniflora</i> ** Dwarf-flowered Heartleaf;	Threatened
(189)	<i>Hibiscus aculeatus</i> Comfortroot;	Threatened

(190)	<i>Hottonia inflata</i> Featherfoil;	Special Concern, Vulnerable
(191)	<i>Houstonia montana</i> ** Roan Mountain Bluet;	Endangered
(192)	<i>Hudsonia montana</i> ** Mountain Golden-heather;	Threatened
(193)	<i>Hudsonia tomentosa</i> Sand Heather;	Threatened
(194)	<i>Hydrastis canadensis</i> Goldenseal;	Special Concern, Vulnerable
(195)	<i>Hymenocallis occidentalis</i> var. <i>occidentalis</i> Hillside Spider-lily;	Special Concern, Historical
(196)	<i>Hymenocallis pygmaea</i> Waccamaw River Spiderlily;	Special Concern, Vulnerable
(197)	<i>Hypericum adpressum</i> Bog St. John's-wort;	Special Concern, Historical
(198)	<i>Hypericum brachyphyllum</i> Coastal Plain St. John's-wort;	Special Concern, Vulnerable
(199)	<i>Hypericum fasciculatum</i> Peelbark St. John's-wort;	Endangered
(200)	<i>Hypericum radfordiorum</i> Radford's St. John's-wort;	Special Concern, Vulnerable
(201)	<i>Hypericum suffruticosum</i> Pineland St. John's-wort;	Special Concern, Historical
(202)	<i>Hypotrachyna virginica</i> Virginia Loop Lichen;	Special Concern, Vulnerable
(203)	<i>Ilex collina</i> Long-stalked Holly;	Special Concern, Vulnerable
(204)	<i>Ipomoea imperati</i> Beach Morning-glory;	Special Concern, Vulnerable
(205)	<i>Ipomoea macrorhiza</i> Manroot;	Special Concern, Historical
(206)	<i>Isoetes microvela</i> Thin-wall Quillwort;	Threatened
(207)	<i>Isoetes piedmontana</i> Piedmont Quillwort;	Threatened
(208)	<i>Isotria medeoloides</i> ** Small Whorled Pogonia;	Threatened
(209)	<i>Iva microcephala</i> Small-headed Marsh Elder;	Threatened
(210)	<i>Jeffersonia diphylla</i> Twinleaf;	Threatened
(211)	<i>Juncus articulatus</i> Jointleafed Rush;	Special Concern, Historical
(212)	<i>Juncus caesariensis</i> New Jersey Rush;	Endangered
(213)	<i>Juniperus communis</i> var. <i>depressa</i> Dwarf Juniper;	Threatened
(214)	<i>Kalmia angustifolia</i> Sheep-laurel;	Threatened
(215)	<i>Koeleria spicata</i> Spike Trisetum;	Special Concern, Historical
(216)	<i>Lachnocaulon minus</i> Brown Bogbutton;	Threatened
(217)	<i>Lechea maritima</i> var. <i>virginica</i> Maritime Pinweed;	Threatened

(218)	<i>Lechea torreyi</i> var. <i>congesta</i> Torrey's Pinweed;	Endangered
(219)	<i>Lejeunea blomquistii</i> A liverwort;	Special Concern, Vulnerable
(220)	<i>Liatris aspera</i> Rough Blazing-star;	Special Concern, Vulnerable
(221)	<i>Liatris helleri</i> ** Heller's Blazing-star;	Threatened
(222)	<i>Liatris microcephala</i> Small-head Blazing-star;	Special Concern, Vulnerable
(223)	<i>Lilium canadense</i> Canada Lily;	Endangered
(224)	<i>Lilium grayi</i> Gray's Lily;	Threatened
(225)	<i>Lilium philadelphicum</i> var. <i>philadelphicum</i> Wood Lily;	Endangered
(226)	<i>Lilium pyrophilum</i> Sandhills Lily;	Endangered
(227)	<i>Limosella australis</i> Awl-leaf Mudwort;	Threatened
(228)	<i>Lindera melissifolia</i> ** Pondberry;	Endangered
(229)	<i>Lindera subcoriacea</i> Bog Spicebush;	Special Concern, Vulnerable
(230)	<i>Linum floridanum</i> var. <i>chrysocarpum</i> Yellow-fruited Flax;	Threatened
(231)	<i>Linum sulcatum</i> Glade Flax;	Special Concern, Historical
(232)	<i>Liparis loeselii</i> Fen Orchid;	Endangered
(233)	<i>Lithospermum canescens</i> Hoary Puccoon;	Threatened
(234)	<i>Litsea aestivalis</i> Pondspice;	Special Concern, Vulnerable
(235)	<i>Lobelia boykinii</i> Boykin's Lobelia;	Endangered
(236)	<i>Lophiola aurea</i> Golden-crest;	Endangered
(237)	<i>Ludwigia lanceolata</i> Lanceleaf Seedbox;	Endangered
(238)	<i>Ludwigia linifolia</i> Flaxleaf Seedbox;	Threatened
(239)	<i>Ludwigia ravenii</i> Raven's Seedbox;	Endangered
(240)	<i>Ludwigia sphaerocarpa</i> Globe-fruit Seedbox;	Endangered
(241)	<i>Ludwigia suffruticosa</i> Shrubby Seedbox;	Threatened
(242)	<i>Lupinus villosus</i> Pink Sandhill Lupine;	Endangered
(243)	<i>Lycopodiella inundata</i> Northern Bog Clubmoss;	Endangered
(244)	<i>Lysimachia asperulifolia</i> ** Rough-leaf Loosestrife;	Endangered
(245)	<i>Lysimachia borealis</i> Northern Starflower;	Threatened

(246)	<i>Lysimachia fraseri</i> Fraser's Loosestrife;	Endangered
(247)	<i>Macbridea caroliniana</i> Carolina Birds-in-a-Nest, Carolina Bogmint;	Endangered
(248)	<i>Magnolia macrophylla</i> Bigleaf Magnolia;	Special Concern, Vulnerable
(249)	<i>Malaxis spicata</i> Florida Adder's-mouth;	Special Concern, Vulnerable
(250)	<i>Marshallia grandiflora</i> Large-flowered Barbara's-buttons;	Special Concern, Historical
(251)	<i>Marshallia legrandii</i> Oak Barrens Barbara's-buttons;	Endangered
(252)	<i>Marshallia trinervia</i> Broadleaf Barbara's-buttons;	Special Concern, Historical
(253)	<i>Melanthium woodii</i> Ozark Buchflower;	Threatened
(254)	<i>Melica nitens</i> Three-flowered Melic;	Endangered
(255)	<i>Menyanthes trifoliata</i> Buckbean;	Threatened
(256)	<i>Micranthes pennsylvanica</i> Swamp Saxifrage;	Endangered
(257)	<i>Mnesithea cylindrica</i> Carolina Jointgrass;	Special Concern, Historical
(258)	<i>Mononeuria groenlandica</i> Greenland Sandwort;	Threatened
(259)	<i>Mononeuria paludicola</i> Godfrey's Sandwort;	Endangered
(260)	<i>Mononeuria uniflora</i> Single-flowered Sandwort;	Endangered
(261)	<i>Moranopteris nimbata</i> West Indian Dwarf Polypody;	Threatened
(262)	<i>Muhlenbergia glomerata</i> Spiked Muhly;	Special Concern, Vulnerable
(263)	<i>Muhlenbergia sobolifera</i> Rock Muhly;	Threatened
(264)	<i>Muhlenbergia torreyana</i> Pinebarren Smokegrass;	Special Concern, Vulnerable
(265)	<i>Myrica gale</i> Sweet Gale;	Endangered
(266)	<i>Myriophyllum laxum</i> Loose Water-milfoil;	Endangered
(267)	<i>Myriophyllum tenellum</i> Leafless Water-milfoil;	Endangered
(268)	<i>Nabalus albus</i> White Rattlesnakeroot;	Special Concern, Vulnerable
(269)	<i>Narthecium montanum</i> Appalachian Yellow Asphodel;	Special Concern, Historical
(270)	<i>Oenothera perennis</i> Perennial Sundrops;	Special Concern, Vulnerable
(271)	<i>Oldenlandia boscii</i> Bosc's Bluet;	Threatened
(272)	<i>Oligoneuron album</i> White Prairie-goldenrod;	Endangered
(273)	<i>Oligoneuron jacksonii</i> Southeastern Bold Goldenrod;	Special Concern, Vulnerable

(274)	<i>Oligoneuron rigidum</i> Midwestern Bold Goldenrod;	Threatened
(275)	<i>Orbexilum macrophyllum</i> Bigleaf Scurfpea;	Special Concern, Historical
(276)	<i>Orbexilum onobrychis</i> Lanceleaf Scurfpea;	Special Concern, Historical
(277)	<i>Orbexilum pedunculatum</i> Western Sampson's Snakeroot;	Endangered
(278)	<i>Oreojuncus trifidus</i> Highland Rush;	Threatened
(279)	<i>Orthochilus ecristatus</i> Spiked Medusa;	Endangered
(280)	<i>Pachysandra procumbens</i> Allegheny Spurge;	Endangered
(281)	<i>Packera crawfordii</i> Crawford's Ragwort;	Endangered
(282)	<i>Packera millefolium</i> Blue Ridge Ragwort;	Special Concern, Vulnerable
(283)	<i>Packera paupercula</i> var. <i>appalachiana</i> Appalachian Ragwort;	Threatened
(284)	<i>Packera paupercula</i> var. <i>paupercula</i> Balsam Ragwort;	Special Concern, Vulnerable
(285)	<i>Packera schweinitziana</i> New England Ragwort;	Threatened
(286)	<i>Packera serpenticola</i> Buck Creek Ragwort;	Threatened
(287)	<i>Palustricodon aparinoides</i> var. <i>aparinoides</i> Marsh Bellflower;	Threatened
(288)	<i>Panicum flexile</i> Wiry Panic Grass;	Threatened
(289)	<i>Parnassia caroliniana</i> Carolina Grass-of-parnassus;	Threatened
(290)	<i>Parnassia grandifolia</i> Bigleaf Grass-of-parnassus;	Threatened
(291)	<i>Paronychia herniarioides</i> Michaux's Whitlow-wort;	Endangered
(292)	<i>Paspalum dissectum</i> Mudbank Crown Grass;	Endangered
(293)	<i>Pedicularis lanceolata</i> Swamp Lousewort;	Threatened
(294)	<i>Pellaea wrightiana</i> Wright's Cliff-brake;	Endangered
(295)	<i>Persicaria hirsuta</i> Hairy Smartweed;	Endangered
(296)	<i>Phacelia maculata</i> Flatrock Phacelia;	Endangered
(297)	<i>Phegopteris connectilis</i> Northern Beech Fern;	Endangered
(298)	<i>Phemeranthus piedmontanus</i> Piedmont Rock-pink;	Endangered
(299)	<i>Pinguicula lutea</i> Yellow Butterwort;	Special Concern, Vulnerable
(300)	<i>Pinguicula pumila</i> Small Butterwort;	Threatened
(301)	<i>Pityopsis graminifolia</i> A Silkgrass;	Endangered

(302)	<i>Plantago cordata</i> Heart-leaf Plantain;	Endangered
(303)	<i>Plantago sparsiflora</i> Pineland Plantain;	Threatened
(304)	<i>Platanthera herbiola</i> Tubercled Rein Orchid;	Special Concern, Vulnerable
(305)	<i>Platanthera integra</i> Yellow Fringeless Orchid;	Threatened
(306)	<i>Platanthera integrilabia**</i> White Fringeless Orchid;	Threatened
(307)	<i>Platanthera nivea</i> Snowy Orchid;	Endangered
(308)	<i>Platanthera peramoena</i> Purple Fringeless Orchid;	Threatened
(309)	<i>Platanthera shriveri</i> Shriver's Purple Fringed Orchid;	Endangered
(310)	<i>Poa saltuensis</i> Old-pasture Bluegrass;	Threatened
(311)	<i>Polemonium reptans</i> var. <i>reptans</i> Spreading Jacob's Ladder;	Threatened
(312)	<i>Polygala hookeri</i> Hooker's Milkwort;	Special Concern, Vulnerable
(313)	<i>Polygala senega</i> Seneca Snakeroot;	Special Concern, Vulnerable
(314)	<i>Polygonella articulata</i> Northern Wireweed, Coast Jointweed;	Special Concern, Historical
(315)	<i>Polygonum glaucum</i> Seabeach Knotweed;	Endangered
(316)	<i>Ponthieva racemosa</i> Shadow-witch;	Threatened
(317)	<i>Portulaca smallii</i> Small's Portulaca;	Threatened
(318)	<i>Potamogeton illinoensis</i> Illinois Pondweed;	Endangered
(319)	<i>Primula meadia</i> Eastern Shooting-star;	Special Concern, Vulnerable
(320)	<i>Pseudognaphalium helleri</i> Heller's Rabbit-tobacco;	Endangered
(321)	<i>Ptilimnium costatum</i> Big Bishop-weed;	Threatened
(322)	<i>Pyrola elliptica</i> Elliptic Shinleaf;	Threatened
(323)	<i>Pyxidantha barbulate</i> var. <i>brevifolia</i> Sandhills Pyxie-moss;	Threatened
(324)	<i>Quercus elliotii</i> Running Oak;	Endangered
(325)	<i>Quercus ilicifolia</i> Bear Oak;	Endangered
(326)	<i>Quercus minima</i> Dwarf Live Oak;	Endangered
(327)	<i>Quercus prinoides</i> Dwarf Chinquapin Oak;	Endangered
(328)	<i>Ranunculus ambigens</i> Water-plantain Spearwort;	Special Concern, Historical
(329)	<i>Ranunculus hederaceus</i> Ivy-leaved Water Crowfoot;	Threatened

(330)	<i>Rhexia aristosa</i> Awned Meadow-beauty;	Special Concern, Vulnerable
(331)	<i>Rhodiola rosea</i> Roseroot;	Endangered
(332)	<i>Rhododendron prinophyllum</i> Election Pink;	Threatened
(333)	<i>Rhus michauxii**</i> Michaux's Sumac;	Endangered
(334)	<i>Rhynchospora crinipes</i> Alabama Beaksedge;	Threatened
(335)	<i>Rhynchospora decurrens</i> Swamp Forest Beaksedge;	Threatened
(336)	<i>Rhynchospora harperi</i> Harper's Beaksedge;	Special Concern, Vulnerable
(337)	<i>Rhynchospora macra</i> Southern White Beaksedge;	Threatened
(338)	<i>Rhynchospora microcarpa</i> Southern Beaksedge;	Threatened
(339)	<i>Rhynchospora odorata</i> Fragrant Beaksedge;	Special Concern, Vulnerable
(340)	<i>Rhynchospora pleiantha</i> Coastal Beaksedge;	Threatened
(341)	<i>Rhynchospora thornei</i> Thorne's Beaksedge;	Special Concern, Vulnerable
(342)	<i>Rhynchospora tracyi</i> Tracy's Beaksedge;	Threatened
(343)	<i>Rubus strigosus</i> American Red Raspberry;	Threatened
(344)	<i>Rudbeckia heliopsidis</i> Sun-facing Coneflower;	Endangered
(345)	<i>Ruellia ciliosa</i> Sandhills Wild-petunia;	Threatened
(346)	<i>Ruellia humilis</i> Low Wild-petunia;	Threatened
(347)	<i>Ruellia purshiana</i> Pursh's Wild-petunia;	Special Concern, Vulnerable
(348)	<i>Ruellia strepens</i> Limestone Wild-petunia;	Endangered
(349)	<i>Sabal palmetto</i> Cabbage Palmetto;	Threatened
(350)	<i>Sabatia kennedyana</i> Plymouth Gentian;	Threatened
(351)	<i>Sageretia minutiflora</i> Small-flowered Buckthorn;	Threatened
(352)	<i>Sagittaria chapmanii</i> Chapman's Arrowhead;	Threatened
(353)	<i>Sagittaria fasciculata**</i> Bunched Arrowhead;	Endangered
(354)	<i>Sagittaria isoetiformis</i> Quillwort Arrowhead;	Threatened
(355)	<i>Sagittaria macrocarpa</i> Streamhead Arrowhead;	Threatened
(356)	<i>Sagittaria weatherbiana</i> Grassleaf Arrowhead;	Endangered
(357)	<i>Sarracenia jonesii**</i> Mountain Sweet Pitcher Plant;	Endangered

(358)	<i>Sarracenia minor</i> var. <i>minor</i> Hooded Pitcher Plant;	Endangered
(359)	<i>Sarracenia oreophila</i> ** Green Pitcher Plant;	Endangered
(360)	<i>Sarracenia purpurea</i> var. <i>montana</i> Southern Appalachian Purple Pitcher Plant;	Endangered
(361)	<i>Sceptridium jenmanii</i> Alabama Grape-fern;	Special Concern, Vulnerable
(362)	<i>Schisandra glabra</i> Magnolia Vine;	Threatened
(363)	<i>Schwalbea americana</i> ** Chaffseed;	Endangered
(364)	<i>Scirpus flaccidifolius</i> Reclining Bulrush;	Endangered
(365)	<i>Scirpus lineatus</i> Drooping Bulrush;	Threatened
(366)	<i>Scleria baldwinii</i> Baldwin's Nutrush;	Threatened
(367)	<i>Scleria bellii</i> Smooth-seeded Hairy Nutrush;	Endangered
(368)	<i>Scleria reticularis</i> Netted Nutrush;	Special Concern, Vulnerable
(369)	<i>Sclerolepis uniflora</i> Sclerolepis;	Threatened
(370)	<i>Scutellaria australis</i> Southern Skullcap;	Endangered
(371)	<i>Scutellaria galericulata</i> Hooded Skullcap;	Special Concern, Historical
(372)	<i>Scutellaria leonardii</i> Shale-barren Skullcap;	Endangered
(373)	<i>Scutellaria nervosa</i> Veined Skullcap;	Endangered
(374)	<i>Sedum pusillum</i> Puck's Orpine;	Endangered
(375)	<i>Senecio suaveolens</i> Sweet Indian-plantain;	Endangered
(376)	<i>Sesuvium maritimum</i> Slender Sea-purslane;	Endangered
(377)	<i>Sesuvium portulacastrum</i> Shoreline Sea-purslane;	Endangered
(378)	<i>Seymeria pectinata</i> ssp. <i>pectinata</i> Comb Seymeria;	Special Concern, Historical
(379)	<i>Shortia brevistyla</i> Northern Oconee Bells;	Threatened
(380)	<i>Shortia galacifolia</i> Southern Oconee Bells;	Special Concern, Vulnerable
(381)	<i>Sideroxylon tenax</i> Tough Bumelia;	Threatened
(382)	<i>Silene ovata</i> Mountain Catchfly;	Special Concern, Vulnerable
(383)	<i>Silphium connatum</i> Virginia Cup-plant;	Special Concern, Vulnerable
(384)	<i>Silphium perfoliatum</i> Common Cup-plant;	Special Concern, Vulnerable
(385)	<i>Sisyrinchium dichotomum</i> ** White Irisette;	Endangered



(386)	<i>Solidago leavenworthii</i> Leavenworth's Goldenrod;	Endangered
(387)	<i>Solidago plumosa</i> Yadkin River Goldenrod;	Threatened
(388)	<i>Solidago radula</i> Western Rough Goldenrod;	Endangered
(389)	<i>Solidago spithamea</i> ** Blue Ridge Goldenrod;	Threatened
(390)	<i>Solidago tortifolia</i> Twisted-leaf Goldenrod;	Endangered
(391)	<i>Solidago verna</i> Spring-flowering Goldenrod;	Threatened
(392)	<i>Solidago villosicarpa</i> Carolina Maritime Goldenrod;	Threatened
(393)	<i>Sparganium acaule</i> Greenfruit Bur-reed;	Endangered
(394)	<i>Spartina pectinata</i> Freshwater Cordgrass;	Threatened
(395)	<i>Sphagnum contortum</i> Contorted Peatmoss;	Threatened
(396)	<i>Sphagnum warnstorffii</i> Fen Peatmoss;	Special Concern, Vulnerable
(397)	<i>Spigelia marilandica</i> Pink-root;	Threatened
(398)	<i>Spiraea corymbosa</i> Shinyleaf Meadowsweet;	Endangered
(499)	<i>Spiraea virginiana</i> ** Virginia Spiraea;	Threatened
(400)	<i>Spiranthes lacera</i> var. <i>lacera</i> Northern Slender Ladies'-tresses;	Endangered
(401)	<i>Spiranthes laciniata</i> Lace-lip Ladies'-tresses;	Special Concern, Vulnerable
(402)	<i>Spiranthes longilabris</i> Giant Spiral Orchid;	Endangered
(403)	<i>Spiranthes lucida</i> Shining Ladies'-tresses;	Endangered
(404)	<i>Spiranthes ochroleuca</i> Yellow Nodding Ladies'-tresses;	Threatened
(405)	<i>Sporobolus heterolepis</i> Prairie Dropseed;	Threatened
(406)	<i>Sporobolus teretifolius</i> Wireleaf Dropseed;	Endangered
(407)	<i>Sporobolus virginicus</i> Seashore Dropseed;	Threatened
(408)	<i>Stachys appalachiana</i> Appalachian Hedge-nettle;	Endangered
(409)	<i>Stachys eplingii</i> Epling's Hedge-nettle;	Endangered
(410)	<i>Stachys matthewsii</i> Yadkin Hedge-nettle;	Endangered
(411)	<i>Stenanthium gramineum</i> Featherbells;	Endangered
(412)	<i>Stenanthium leimanthoides</i> Pinebarrens Death-camas;	Threatened
(413)	<i>Stylisma aquatica</i> Water Dawnflower;	Endangered

(414)	<i>Stylisma pickeringii</i> var. <i>pickeringii</i> Pickering's Dawnflower;	Special Concern, Vulnerable
(415)	<i>Swida asperifolia</i> Eastern Roughleaf Dogwood;	Endangered
(416)	<i>Swida racemosa</i> Gray Dogwood;	Special Concern, Vulnerable
(417)	<i>Symphyotrichum concinnum</i> Narrow-leaved Smooth Aster;	Endangered
(418)	<i>Symphyotrichum depauperatum</i> Serpentine Aster;	Endangered
(419)	<i>Symphyotrichum georgianum</i> Georgia Aster;	Threatened
(420)	<i>Symphyotrichum oblongifolium</i> Eastern Aromatic Aster;	Threatened
(421)	<i>Symphyotrichum rhiannon</i> Buck Creek Aster;	Threatened
(422)	<i>Synandra hispidula</i> Synandra;	Threatened
(423)	<i>Taxus canadensis</i> Canada Yew;	Threatened
(424)	<i>Thalictrum cooleyi</i> ** Cooley's Meadowrue;	Endangered
(425)	<i>Thalictrum macrostylum</i> Small-leaved Meadowrue;	Special Concern, Vulnerable
(426)	<i>Thaspium pinnatifidum</i> Mountain Thaspium;	Endangered
(427)	<i>Thermopsis fraxinifolia</i> Ash-leaved Golden-banner;	Special Concern, Vulnerable
(428)	<i>Tiedmannia [Oxypolis] canbyi</i> ** Canby's Dropwort;	Endangered
(429)	<i>Triantha glutinosa</i> Sticky Bog Asphodel;	Special Concern, Vulnerable
(430)	<i>Trichostema brachiatum</i> Glade Bluecurls;	Endangered
(431)	<i>Trichostema nesophilum</i> Dune Bluecurls;	Special Concern, Vulnerable
(432)	<i>Tridens ambiguus</i> Pineland Triodia;	Endangered
(433)	<i>Tridens chapmanii</i> Chapman's Triodia;	Special Concern, Vulnerable
(434)	<i>Tridens strictus</i> Spike Triodia;	Special Concern, Historical
(435)	<i>Trifolium carolinianum</i> Carolina Clover;	Special Concern, Historical
(436)	<i>Trifolium reflexum</i> Buffalo Clover;	Threatened
(437)	<i>Trillium discolor</i> Pale Yellow Trillium;	Threatened
(438)	<i>Trillium flexipes</i> Bent White Trillium;	Threatened
(439)	<i>Trillium pusillum</i> var. <i>ozarkanum</i> Alabama Least Trillium;	Endangered
(440)	<i>Trillium pusillum</i> var. <i>pusillum</i> Carolina Least Trillium;	Endangered
(441)	<i>Trillium pusillum</i> var. <i>virginianum</i> Virginia Least Trillium;	Endangered

(442)	<i>Trillium recurvatum</i> Prairie Trillium;	Threatened
(443)	<i>Trillium sessile</i> Sessile-flowered Trillium;	Threatened
(444)	<i>Trillium simile</i> Sweet White Trillium;	Special Concern, Vulnerable
(445)	<i>Turritis glabra</i> Tower Mustard;	Endangered
(446)	<i>Urtica chamaedryoides</i> Dwarf Stinging Nettle;	Threatened
(447)	<i>Utricularia cornuta</i> Horned Bladderwort;	Threatened
(448)	<i>Utricularia geminiscapa</i> Two-flowered Bladderwort;	Special Concern, Vulnerable
(449)	<i>Utricularia minor</i> Small Bladderwort;	Special Concern, Historical
(450)	<i>Utricularia olivacea</i> Dwarf Bladderwort;	Threatened
(451)	<i>Utricularia resupinata</i> Northeastern Bladderwort;	Endangered
(452)	<i>Vaccinium macrocarpon</i> Cranberry;	Threatened
(453)	<i>Vandenboschia boschiana</i> Appalachian Filmy-fern;	Endangered
(454)	<i>Veronica americana</i> American Speedwell;	Threatened
(455)	<i>Warea cuneifolia</i> Carolina Pineland-cress;	Endangered
(456)	<i>Waldsteinia lobata</i> Lobed Barren-strawberry;	Endangered
(457)	<i>Woodsia ilvensis</i> Rusty Cliff Fern;	Endangered
(458)	<i>Xyris floridana</i> Florida Yellow-eyed-grass;	Special Concern, Vulnerable
(459)	<i>Xyris scabrifolia</i> Roughleaf Yellow-eyed-grass;	Special Concern, Vulnerable
(460)	<i>Xyris serotina</i> Acid-swamp Yellow-eyed-grass;	Special Concern, Historical
(461)	<i>Xyris stricta</i> Pineland Yellow-eyed-grass;	Endangered
(462)	<i>Zephyranthes simpsonii</i> Florida Atamasco-lily.	Endangered